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UNITED STATES AIR FORCE

Installation Restoration Program

Final
Interim Removal Action Completion Report
for IRP Site 4
Air Force Plant 42
Palmdale, California

January 2006

Task Order 189 – Contract F41624-00-D-8021

Prepared for:

Restoration Branch, Acquisition Environmental
Safety and Health (ASC/ENVR)
Aeronautical Systems Center
Wright-Patterson Air Force Base, Ohio

and

Air Force Center for Environmental Excellence (AFCEE)
HQ AFCEE/ERD
Brooks City-Base, Texas

Prepared by:

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Copy #2

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Abbreviations and Acronyms

°C	degrees Celsius
AFCEE	Air Force Center for Environmental Excellence
AFP 42	Air Force Plant 42
AVAPCD	Antelope Valley Air Pollution Control District
bgs	below ground surface
COPC	chemicals of potential concern
DTSC	Department of Toxic Substances Control
ELCR	excess lifetime cancer risk
EM	electromagnetic
EPA	United States Environmental Protection Agency
GPR	ground-penetrating radar
IRP	Installation Restoration Program
MDL	method detection limit
mg/kg	milligram(s) per kilograms
msl	mean sea level
NAD	North American Datum
PID	photoionization detector
QAPP	Quality Assurance Project Plan
QA/QC	quality assurance/quality control
RAW	Removal Action Workplan
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RPD	relative percent deviation
RWQCB	Regional Water Quality Control Board
UST	underground storage tank
VOC	volatile organic compound

1. Introduction

The Air Force contracted CH2M HILL to perform an interim removal action at Installation Restoration Program (IRP) Site 4, vehicle washrack and leaking underground storage tank (UST), at Air Force Plant 42 (AFP 42), located in Palmdale, California. A remedial investigation (RI) was performed previously at Site 4 and is documented in the *Final Remedial Investigation Report for Operable Units 1, 2, 3, 4, and 5, Air Force Plant 42, Palmdale, California*, dated December 2003 (amended March 2004) (CH2M HILL, 2004a). Based on the results of the RI, an interim removal action was proposed for Site 4 in the *Final Removal Action Workplan for Interim Removal Actions at IRP Sites 4 and 6, Air Force Plant 42, Palmdale California*, dated December 2004 (CH2M HILL, 2004b).

This Interim Removal Action Completion Report describes the Site 4 removal action activities performed in March 2005. The California Department of Toxic Substances Control (DTSC) is the lead regulatory agency for the removal action activities at Site 4. In addition, the Regional Water Quality Control Board (RWQCB), Lahontan Region, participates as a review agency for IRP activities at AFP 42.

1.1 Scope and Purpose of Report

This report addresses waste removal and confirmation sampling activities performed in March 2005 at Site 4. The purposes of this report are as follows.

- Document the removal action activities performed at Site 4.
- Present the methodology and laboratory analytical results for the confirmation sampling activities performed as part of the removal action.
- Compare confirmation sampling results to the Site 4 target cleanup goal documented in the Removal Action Workplan (RAW).
- Provide conclusions regarding the effectiveness of the removal action activities completed.

1.2 Report Organization

This removal action report is organized into the subsections described below.

- Section 1 – Introduction. This section describes the project background, purpose of the removal action, and the organization of this updated interim completion report.
- Section 2 – Description and Environmental Setting. This section describes the physical description, historical use, and chemicals of interest for Site 4.
- Section 3 – Removal Action Activities. This section summarizes the removal action activities completed to date at Site 4, including waste removal, waste management, confirmation soil sampling, and post-removal action field activities.

- Section 4 – Analytical Results. This section presents a summary of the analytical results for the removal action confirmation samples and compares analytical results to the cleanup goal (AFP 42 background concentration).
- Section 5 – Conclusions and Recommendations.
- Section 6 – References.

Appendixes for this closure report are as follows.

- Appendix A – Presents the trench log for the excavation at Site 4.
- Appendix B – Contains copies of the waste manifests generated during the removal action at Site 4.
- Appendix C – Presents the laboratory analytical results for the soil sampling performed during the Site 4 removal action.

2. Site Description and Environmental Setting

This section describes the physical conditions, historical use, and chemicals of interest for Site 4.

2.1 Physical Description

AFP 42 is located approximately 65 miles north of Los Angeles in the Antelope Valley region of Southern California as shown in Figure 2-1. The nearest communities are Palmdale, which is approximately 3 miles south of AFP 42, and Lancaster, which is approximately 5 miles north of AFP 42. AFP 42 encompasses approximately 5,832 acres (about 9.1 square miles). The AFP 42 layout is shown in Figure 2-2.

Site 4 is located in the southeastern portion of the airfield at AFP 42, directly west of Site 6. Site 4 is situated within Site 5, which is referred to as the "Common Areas." The physical description of Site 4 is presented below and includes information on site location, current site use, topography, drainage and surface water, geology, and hydrogeology and groundwater use.

2.1.1 Location

Site 4, Vehicle Washrack and Leaking UST, is located in the southeastern portion of AFP 42, 340 feet southeast of Runway 4-22 (Figure 2-2). The Site 4 boundaries encompass a shallow drainage swale situated adjacent to the vehicle washrack at Building 531 and extend north and east along an unlined drainage ditch leading from the vehicle washrack. The drainage ditch is approximately 900 feet long and ranges from 8 to 35 feet wide and 1 to 4 feet deep (31,500 square feet; 0.72-acre). A leaking waste oil UST (Tank T5-20) located adjacent to the vehicle washrack was removed in 1983 along with contaminated soil in the vicinity.

2.1.2 Current Site Use

The washrack at Site 4 is currently operable and active. The active washrack area has been modified to be fully self contained. Vehicle washing activities are performed in the eastern portion of the original washrack area, where concrete curbs have been constructed to retain washwater. A drain in the center of the washrack collects the washwater and diverts it to a water recycling unit located adjacent to the east side of the washrack. Treated washwater is reused at the washrack. At the western portion of the original washrack, vehicle washing activities have been ceased permanently. Therefore, the washrack area adjacent to Site 4 no longer discharges to the drainage swale or drainage ditch that comprises Site 4. An aerial photograph showing the Site 4 area is provided in Figure 2-3.

2.1.3 Topography, Drainage, and Surface Water

No natural surface waters exist at Site 4. Stormwater in the vicinity of Site 4 drains toward the drainage ditch within the site boundaries. The ditch receives stormwater runoff from the washrack via a concrete surface drain originating at the northern end of the washrack.

Stormwater runoff also enters the ditch along the small drainage swale adjacent to the washrack. In addition, the ditch receives runoff from a paved parking area north of Building 531 at the same entry point as the concrete surface drain from the washrack. Runoff in the shallow drainage swale adjacent to the washrack also could flow south, into the ditch along the edge of the pavement. Water in the ditch evaporates, percolates into the ground, or flows north to AFP 42 stormwater ponds located along Avenue M (Figure 2-4).

2.1.4 Geology

Lithologic information for Site 4 was collected from two 50-foot-deep borings and two 20-foot-deep borings drilled at the site in 1985 and 1986, respectively. Sediments observed to 50 feet below ground surface (bgs) consisted of interbedded clays and sands with some silt and gravel (Engineering-Science, 1987).

The six borings drilled within Site 4 during the shallow and deep soil investigation performed in 2000 extended to depths ranging from 12 to 90 feet bgs. In Boring 04-1A, silt and clay were encountered from the ground surface to 40 feet bgs; and sand was encountered at 60 feet bgs. In Borings 04-1A and 04-1B, interbedded silts and sands with a small percentage of gravel were encountered beyond the maximum depth (50 feet bgs) explored in previous investigations. The boring logs for the shallow and deep soil investigations performed during 2000 are provided in Appendix A-2 of the RI report (CH2M HILL, 2004a).

2.1.5 Hydrogeology and Groundwater Use

No monitoring wells are located in the immediate vicinity of Site 4. The closest monitoring wells to Site 4 are MW-1, MW-2, and MW-3 for the former firefighter training facility located approximately 4,200 feet northwest and upgradient of the site. Other wells in proximity of Site 4 include Production Well DW7-1 (located approximately 4,400 feet west and cross gradient) and Monitoring Well MW5-1 (located approximately 4,600 feet northwest and upgradient). See Figure 2-2 for the locations of these wells relative to Site 4.

Based on water-level data from September 2002, the depth to groundwater at Site 4 is approximately 420 feet bgs, at an elevation of 2,100 feet above mean sea level (msl). The groundwater in the area flows approximately south-southwest.

2.1.6 Ecology

Vegetation at Site 4 is generally sparse and consists predominantly of non-native grassland. During a February 26, 2002, site visit to Site 4, standing water was present in the drainage ditch portion of the site, which resulted in plant growth in the ditch. The source of the water was recent runoff from the washrack at Building 531. The washrack has been modified to prevent its activities from discharging to the drainage ditch, and dry-weather water flow into the drainage ditch no longer occurs. Based on this information, the vegetation observed in the drainage swale during the site visit was temporary. Additionally, the AFP 42 drainage system routinely is cleared of vegetation to maintain the capacity of the system.

Therefore, the Site 4 ditch does not support viable ecological habitat. No endangered, threatened, or rare plant or animal species were observed during the 1995 and 1996 endangered species surveys performed at AFP 42; therefore, none are expected to occur at Site 4 (Parsons, 1996).

2.2 Site History

The history for Site 4 is presented below and includes a discussion of site chronology and chemicals of interest.

2.2.1 Site 4 History

The Site 4 washrack historically was used for steam cleaning operations. Between 1954 and 1983, wastewaters containing engine dirt, oils, fuels, and detergents from the washrack were discharged into the adjacent storm drainage ditch. No information is available regarding the volume of wastewater generated and discharged. Surface water runoff from the aircraft runway and parking areas also discharges to the Site 4 drainage ditch.

Prior to July 1983, waste engine oils, hydraulic fluids, and small quantities of spent solvents from maintenance operations in Building 531 were placed in a 550-gallon underground waste oil tank located adjacent to the vehicle washrack. It appears that liquids were transported to UST T5-20 and poured directly into the UST. No evidence of a drain or pipeline discharging to the UST was found in the engineering drawings for Building 531. Small spills are reported to have resulted during transfer operations. When full, the contents of the underground waste oil tank were pumped and removed from AFP 42 by a contractor for offsite disposal (CH2M HILL, 1983).

In 1983, the soil surrounding the underground waste oil tank was partially excavated, and the tank was found to have leaks. In 1983, the tank was excavated and removed along with the visibly contaminated soil in its vicinity (Engineering-Science, 1987). Available records do not indicate that confirmation sampling was conducted after the tank was decommissioned. The amount of material lost from the tank was not reported (Engineering-Science, 1987).

2.2.2 Remedial Investigation Results

Field investigations during the RI at Site 4 indicated the presence of arsenic in a portion of the drainage ditch as the primary risk contributor. The highest concentration of arsenic was found in shallow soil at the inlets to the Site 4 drainage ditch. The noncarcinogenic hazard risks were less than 1.0 for all worker scenarios evaluated and, therefore, were considered acceptable by regulatory agencies. The excess lifetime cancer risk (ELCR) estimate (total for ingestion, dermal, and inhalation routes) for exposures of potential future trench workers to chemicals of potential concern (COPCs) in soils at Site 4 (less than $1x10^{-6}$) was also considered acceptable. However, the low-end and high-end ELCR estimates for the current and potential future intermittent security/maintenance worker and potential future occupational worker exposure scenarios exceeded ($1.4x10^{-6}$ to $1.4x10^{-5}$) the acceptable risk level. Elevated arsenic (27 milligrams per kilogram [mg/kg]) detected in one surface soil sample at the drainage ditch inlet contributed 84 to 88 percent of the risk. Approximately 30 percent of the site risk was attributable to naturally occurring levels of arsenic. Based on these ELCR values, a removal action was recommended for Site 4. The deep soil investigation results indicate that there is a low potential threat to groundwater at Site 4.

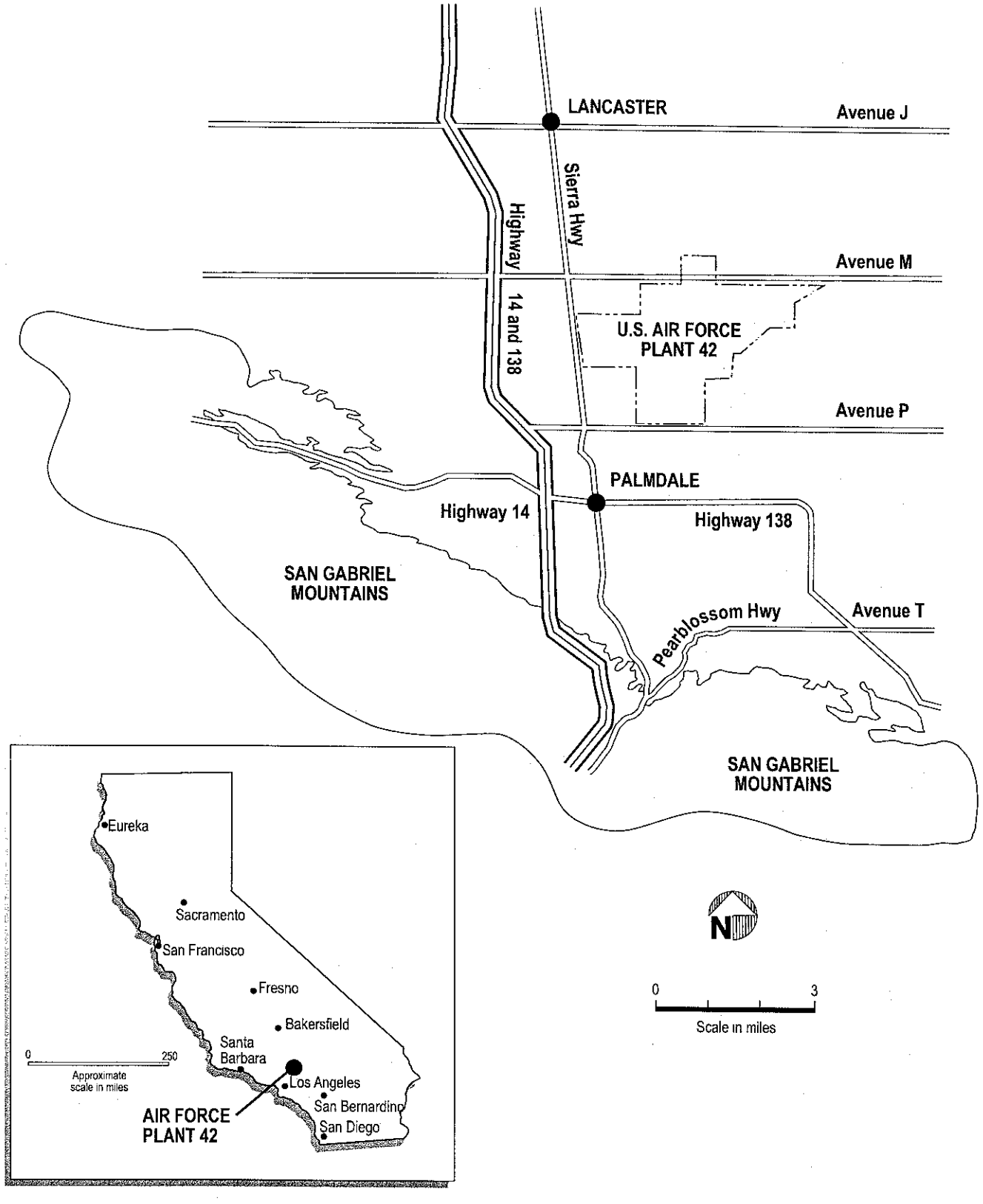


Figure 2-1
Location Map
AFP 42

CH2MHILL

SCO171230.02.13.90 location map fh11 7/05

Onsite Contractor Plants
Plant Site 1 = Boeing North America
Plant Site 2 = Lockheed Martin
Plant Site 3 = Northrop Grumman
Plant Site 4 = Northrop Grumman
Plant Site 5 & 6 = Air Force and Pyramid (O&M Contractor)
Plant Site 7 = Lockheed Martin
Plant Site 8 = Lockheed Martin

IRP Site Number	Description
4	Vehicle Washrack and Leaking UST

Former Wastewater Treatment Facility
MW-W2
MW-W1
20th Street East
Avenue M
Plant Site 1
Plant Site 2
Plant Site 3
Plant Site 4
MW1-1
MW1-2
MW1-9
MW1-10
MW1-4
MW1-5
MW1-3
MW1-8
DW1-1
DW1-3
MW1-7
MW1-6
MW2-1
MW2-2
DW2-2
DW2-1
MW3-2
DW3-3
FW-2C
FW-2B
DW3-2
DW3-1
MW3-1
DW4-2
DW4-1
MW4-1
Common Areas (Plant Site 5)
AFP 42 Emergency Landing Area (See Inset A)
Sierra Highway
MW5-1
MW-3
MW-2
MW-1
Common Areas (Plant Site 5)
Plant Site 7
Plant Site 6
4
DW8-1
MW8-1
Plant Site 8
DW7-1
FW1
DW10-1
15th Street East
20th Street East
25th Street East
DWX-1
DWX-2

Inset A
Avenue N
10th Street West
AFP 42 Emergency Landing Area
Sierra Highway

Legend:
- Monitoring Well
- Production Well
- Air Force Plant 42 Boundary
- Industrial Plant Site Boundary
- Fence
- IRP Site

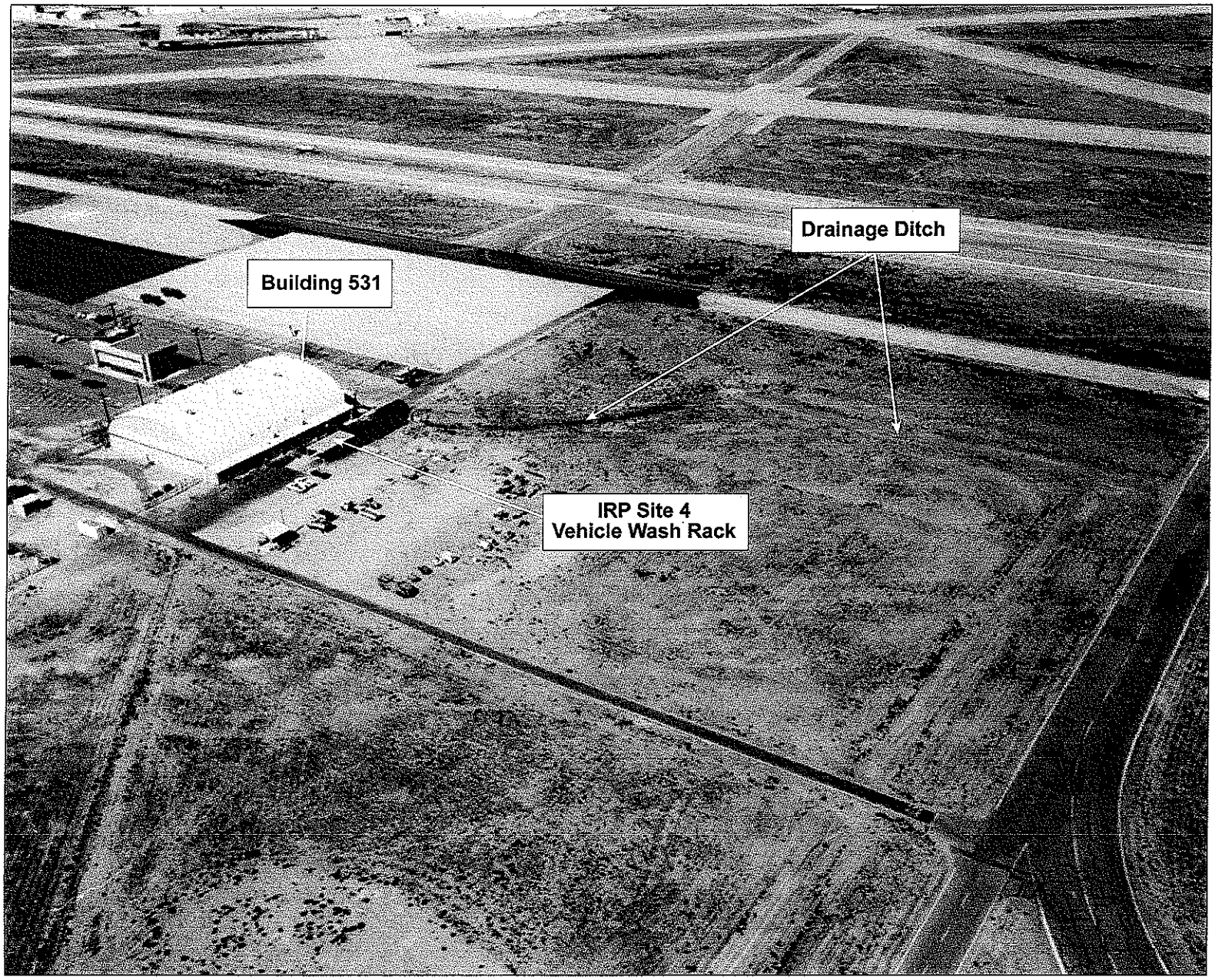
N
0 2,000 4,000 Feet

Source: Aeronautical Systems Center (ASC), 2004

Figure 2-2
Air Force Plant 42 Layout and IRP Site Locations

CH2MHILL
Date: 07/27/2005

File Path: \\gafltGIS2\afp42sds\plots\2005\All_Plants\GeneralMapSite4and6_072505.mxd, Date: 07/25/2005



Source: US Army Corps of Engineers, 1993

Figure 2-3
Aerial Photo View of Site 4
Air Force Plant 42

CH2MHILL

SCO171230.02 13 90 Site4-26e fn11 7/05

ONSITE CONTRACTOR PLANTS

Plant Site 1 = Boeing North American
Plant Site 2 = Lockheed Martin
Plant Site 3 = Northrop Grumman
Plant Site 4 = Northrop Grumman
Plant Sites 5 & 6 = Air Force and Pyramid (O&M Contractor)
Plant Site 7 = Lockheed Martin
Plant Site 8 = Lockheed Martin

Location of Former Wastewater Treatment Facility

Stormwater Runoff Ponds

Avenue M

Plant Site 1

Plant Site 2

Plant Site 3

Plant Site 4

Runway 7-25

Runway 4-22

Common Areas (Plant Site 5)

Plant Site 8

Plant Site 7

Site 4

Common Areas (Plant Site 5)

Lockheed Martin Aeronautics Company – Palmdale Plant 10

Sierra Highway

Site 6

Plant Site 6

25th Street East

Palmdale Air Terminal

Avenue P

LEGEND:

Storm Drain with Surface Catchment Basins

Drainage Ditch

N

0 4000

Approximate Scale in Feet
1 inch = 2 000 feet

Figure 2-4
Surface Runoff and Drainage System
AFP 42

CH2MHILL

SCO171230.02 13 90 sitemap05 fh11 7/05

3. Removal Action Activities at Site 4

This section describes the removal action activities performed at Site 4 from March 1 through March 4, 2005. The following sections describe the removal action activities in greater detail and are organized as follows.

- Section 3.1 - Site Preparation Activities
- Section 3.2 - Soil Excavation Activities
- Section 3.3 - Confirmation Sampling Activities
- Section 3.4 - Post-Removal Action Field Activities (including surveying and waste management)
- Section 3.5 - Health and Safety

3.1 Site Preparation Activities

Prior to initiation of the soil excavation activities, CH2M HILL performed a site visit to mark the planned excavation area and known subsurface utility locations onsite. Site features were clearly marked using flagged wooden stakes.

An initial geophysical survey was performed in 2000 by Spectrum E.S.I. (San Fernando, California), a subcontractor to CH2M HILL for the RI. In preparation for the removal action activities, a second geophysical survey was performed by Geovision, Inc. (Corona, California) in February 2005.

The geophysical surveys were performed using electromagnetic (EM) ground conductivity and/or ground-penetrating radar (GPR) methods. During both geophysical surveys, a group of utilities was identified east of the drainage inlet, within the planned excavation area. Utilities were marked using wooden stakes and flagging.

CH2M HILL coordinated the onsite removal action activities with AFP 42 facility and security representatives during a preconstruction meeting held at AFP 42 on February 8, 2005. AFP 42 facility representatives provided approval for the planned removal action activities prior to field mobilization.

3.2 Excavation Activities

Site 4 excavation activities were performed from March 1 to March 4, 2005. El Capitan Environmental Services, Inc. (Sun Valley, California) served as the general contractor for the removal action. All field activities were performed under the direct oversight of a CH2M HILL field manager.

Airborne dust during the removal action was minimized by implementation of access and dust control measures. A water trailer/spray gun was used to keep surface soil wet to

suppress dust generation. Field staff continuously monitored dust generation at the site to ensure compliance with Antelope Valley Air Pollution Control District (AVAPCD) regulations.

Initial excavation activities were performed on March 1, 2005, using a skip loader. During the excavation activities, caution tape marking an electrical line was discovered at approximately 2 feet bgs. The excavation was continued by hand, using shovels to remove soil surrounding the electrical line. Approximately 27 tons of soil were removed. This initial excavation measured approximately 25 feet long by 8 feet wide by 2.5 feet deep. No soil staining, odors, or elevated organic vapor measurements were detected during the excavation activities.

One progress sample from the initial excavation bottom at 2.5 feet bgs contained arsenic concentrations greater than the target cleanup goal (9.0 mg/kg). Arsenic concentrations measured 13.83 mg/kg in the progress sample and 10.21 mg/kg in the field duplicate. Results of the progress samples are shown in Table 3-1. The excavation in the area of the elevated arsenic detection was extended approximately to 8 feet wide by 15 feet long to a maximum depth of 4 feet bgs (Figure 3-1). Due to the presence of the electrical line at this location, the excavation was performed with shovels. During this supplemental excavation, approximately 17 tons of soil were removed.

During the removal action activities at Site 4, excavated soils were stockpiled onsite. The stockpiles were placed atop plastic sheeting and the piles were covered with plastic sheeting secured in place. Using a front-loader, the stockpiled soil was transferred to a covered truck trailer and one closed-lid roll-off bin for offsite transportation.

A total of approximately 44 tons of soil was removed from Site 4. The soil was disposed as California hazardous waste (i.e., non-Resource Conservation and Recovery Act [RCRA] waste) at the Chemical Waste Management Facility in Kettleman City, California.

3.3 Confirmation Sampling Activities

Following completion of the excavation activities at Site 4, confirmation soil samples were collected to demonstrate that cleanup goals had been achieved. Four soil samples were collected from the bottom of the final excavation (three samples at 4 feet bgs and one sample at 2.5 feet bgs), and two soil samples were collected from the ditch bottom, one sample from the upstream edge of the excavation, and one sample from the downstream edge of the excavation. The confirmation sampling locations are shown in Figure 3-1.

Confirmation samples were collected directly from the soil surface using a drive sampler fitted with a stainless steel sample sleeve. Immediately following sample collection, the stainless steel sleeves were capped on both ends with Teflon™ sheeting and plastic end caps. The stainless steel sleeves then were affixed with a completed sample label, placed in a resealable plastic bag, and put in an iced cooler maintained at a temperature less than 4 degrees Celsius (°C). The sample number, location, and depth were recorded in the field logbook.

Samples were sent to Columbia Analytical Laboratory in Redding, California, for quick turnaround results. Analysis for arsenic was performed using U.S. Environmental Protection Agency (EPA) Method 6020B.

3.4 Post-Removal Activities

3.4.1 Backfill

Following the completion of the removal and sampling activities at Site 4, the excavation was backfilled with approximately 74 tons of certified clean fill. The clean fill was supplied by Service Rock Products, Palmdale, California.

3.4.2 Surveying

Upon completion of the removal action activities, State of California-licensed surveyors surveyed the confirmation sample locations and the extent of the excavation areas. Norris Repke Surveying, Inc. (Santa Ana, California) performed the survey activities on August 9, 2005. The coordinates derived from the surveys are based on monuments located within AFP 42 and are on the California State Plane Coordinate System, Zone VII, North American Datum (NAD) 83. Target locations were surveyed in the horizontal plane to an accuracy of 0.1-foot. The depths of the excavation area is based on field measurements collected by CH2M HILL field staff.

3.4.3 Waste Management

As described in Section 3.2, removal action wastes consisted of excavated soil classified as California-hazardous waste. El Capitan Environmental Services, Inc. managed the removal action waste transportation and disposal. Transportation routes for waste haulers were followed as presented in the RAW (CH2M HILL, 2004b). The California Uniform Manifest form provided by the waste hauler was used for transporting the contaminated soil. A representative from Pyramid Services, Inc. (AFP 42 onsite facility operations and maintenance contractor) signed the manifests that accompanied the waste to the designated disposal facility. The disposal facility provided certified weight tickets for each load showing the net weight of material disposed. The waste manifests for the Site 4 removal action are provided in Appendix B.

3.5 Health and Safety

A health and safety plan was developed prior to the removal action and confirmation sampling activities to protect workers during field activities. The plan addressed potential hazards posed by the contaminated soil, worker safety near heavy equipment, and general site conditions. The site-specific worker health and safety plan included a description of tasks (i.e., soil excavation and soil sampling activities), presented chemicals of concern, identified personal protective equipment specifications, and provided air monitoring specifications. Subcontractors were required to implement similar health and safety programs designed to protect their workers from job-specific hazards.

The removal action activities were performed in Level D personal protective equipment. Dust suppression activities were found effective in controlling airborne particulates. A dust monitor was used during excavation activities to monitor worker breathing zones for particulate matter. Although the RI sampling data indicated that no elevated volatile organic compound (VOC) concentrations existed in the excavation area, as a precautionary measure, the worker breathing zone was monitored for organic vapors using a photoionization detector (PID) during the removal action and confirmation sampling field activities. No organic vapors were detected during the fieldwork activities.

Table 3-1
Arsenic Detected in Progress Samples at Site 4
Air Force Plant 42
(Concentrations expressed in mg/kg)

Sample ID	Sample Type	Location	Depth (ft bgs)	Arsenic	Q
AFP 42 Background Level / Target Cleanup Goal				9.0	--
04SFE2001	N	8 feet upstream of original hot spot	2.5	13.83	
04SFE2101	FD	8 feet upstream of original hot spot	2.5	10.21	
04SFE4001	N	Former hot spot	2.5	3.52	M

Notes:
Shaded cells indicate arsenic detected above
AFP 42 background level.
ft bgs - feet below ground surface
mg/kg - milligrams per kilogram
N - normal sample
FD - field duplicate sample

Data Qualifiers (Q):
M - A matrix effect was present.

Legend:

⊙ Approximate Confirmation Sample Location

Site 4 Excavation Area

IRP Site 4

Source: Aeronautical Systems Center (ASC), 2004

N

0 15 Feet

Figure 3-1
IRP Site 4
Confirmation Sample Locations
Air Force Plant 42 Palmdale, California

4. Confirmation Soil Sample Results

This section presents a summary of the confirmation soil sampling results for the Site 4 removal action. It contains the following information:

- Section 4.1 – Target Cleanup Goal
- Section 4.2 – Summary of Sampling Results
- Section 4.3 – Laboratory Quality Assurance/Quality Control (QA/QC) Summary and Results
- Section 4.4 – Cleanup Goal Evaluation

4.1 Target Cleanup Goal

This section discusses the cleanup goal that was selected to assess the effectiveness of the removal action performed at Site 4. An evaluation of the achievement of the cleanup goal is included in Section 4.4. The DTSC-approved RAW identified the AFP 42 background concentration for arsenic (9.0 mg/kg) as the cleanup goal. The background concentration for arsenic is based on typical concentrations found in shallow soil at the IRP sites for Operable Units 1, 2, 3, 4, and 5 at AFP 42. The method for calculating this value is presented in the *Final Remedial Investigation Report for Operable Units 1, 2, 3, 4, and 5* (CH2M HILL, 2004a).

4.2 Summary of Sampling Results

The laboratory analytical results for the confirmation soil samples are summarized in Table 4-1. Following the excavation activities, three confirmation soil samples were collected from the bottom of the final excavation at approximately 4 feet bgs, and one confirmation sample was collected from the bottom of the final excavation at approximately 2.5 feet bgs. The arsenic concentrations in the four confirmation samples collected from the excavation bottom ranged from 4.17 to 7.95 mg/kg. Arsenic concentrations in the surface-soil samples collected directly upgradient or downgradient of the excavation (Sample IDs 04SFE1001 and 04SFE1003) were 1.88 F mg/kg and 3.49 mg/kg, respectively. The "F" qualifier denotes that arsenic was identified positively below the reporting limit.

4.3 Laboratory QA/QC Summary and Results

Site 4 confirmation samples were analyzed for arsenic. Analytical methodology and associated quality control procedures, levels of effort (frequency of quality control measurements), acceptance limits, corrective action requirements, and documentation have been detailed in the project Quality Assurance Project Plan (QAPP) (CH2M HILL, 2004b). Also detailed in the QAPP are the data review methodology and overall QA/QC procedures for the data-generation cycle.

QA/QC reviews of the analytical data were performed as specified in the QAPP. The findings are detailed in batch/parameter-specific data validation reports covering all

individual site samples (presented in a separate Analytical Data Informal Technical Information Report). An overview of the QA/QC review activities and findings is provided below. Columbia Analytical Services in Redding, California, performed the laboratory analyses.

All laboratory data have been evaluated by project chemists who are independent of the laboratories. The purpose of the review was to ensure conformance to analytical and QC specifications in the project QAPP and Air Force Center for Environmental Excellence (AFCEE) QAPP. The reviews addressed all QC data specified in the project QAPP. The QC data were reviewed for conformance to procedures, level of effort (i.e., frequency of analyses), quantitative acceptance limits, and corrective action requirements. These reviews have been detailed in sample- and analyte-specific validation reports. An overview of the findings follows.

- The analytical laboratories established method detection limits (MDLs) prior to the start of work per Title 40, Part 136, Appendix C, of the *Code of Federal Regulations* to ensure that all laboratory-specific limits met project needs. All the reported detection limits were in alignment with project-specific needs as listed in the project QAPP.
- Data completeness as defined in the project QAPP is a measure of percentage of valid data obtained from the analytical measurements; validity is assessed by the QAPP criteria. Data completeness was determined to be above 95 percent at large, and, therefore, meets project needs.
- Per project sampling and QAPP plans, field QC samples were collected at the defined frequencies on a site-specific basis (CH2M HILL, 2004b). Thus, the results of these field QC samples were applied to the corresponding site samples to assess overall precision, accuracy, and representativeness. Field QC data (expressed as relative percent deviation [RPD] for duplicate measurements, as field blank sample concentrations, and as percent recoveries) have been used to qualify data usage and are summarized below.
  - The observed range for RPDs for field duplicate sample results is below 50 percent. Heterogeneity of metals in soils is known to be generally large because these chemicals do not distribute well in soil. The RPD is a measure of the nature of the distribution of chemicals in soil; the larger the RPD, the greater the heterogeneity.
  - Field blank measurements did not show detections above the reporting limits.

Onsite audits of the laboratories were carried out in conjunction with previous AFP 42 tasks for the laboratory that performed the analyses for this task (Columbia Analytical Services of Redding, California).

4.4 Cleanup Goal Evaluation

As described in Section 4.1, the cleanup goal for the Site 4 removal action is defined as the AFP 42 background concentration for arsenic (9.0 mg/kg). As summarized in Table 4-1, the arsenic concentrations in all six confirmation samples were less than the target cleanup goal.

Table 4-1
Arsenic Detected in Confirmation Samples at Site 4
Air Force Plant 42
(Concentrations expressed in mg/kg)

Sample ID	Sample Type	Location	Depth (ft bgs)	Arsenic	Q
AFP 42 Background Level / Target Cleanup Goal				9.0	--
04SFE1001	N	Surface soil sample upstream of excavation	0.0	1.88	F
04SFE1002	N	8 feet upstream of 04SFE2002	4.0	4.49	
04SFE2002	N	8 feet upstream of original hot spot	4.0	5.20	
04SFE3001	N	Surface soil sample downstream of excavation	0.0	3.49	
04SFE4002	N	Former hot spot	4.0	4.17	
04SFE5001	N	7 feet downstream of original hot spot	2.5	7.95	

Notes:
Shaded cells indicate arsenic detected above
AFP 42 background level.
ft bgs - feet below ground surface
mg/kg - milligrams per kilogram
N - normal sample

Data Qualifiers (Q):
F - The analyte was positively identified, but the
associated numerical value is below the reporting limit.

5. Conclusions and Recommendations

Soil removal and offsite disposal activities were performed at an area of elevated arsenic concentrations in the Site 4 ditch. The excavation measured approximately 25 feet long by 8 feet wide and ranged from 2.5 to 4 feet deep. A total of approximately 44 tons of soil were removed from Site 4 and disposed as California hazardous waste at an appropriate offsite landfill.

Arsenic concentrations in the soil samples collected upon completion of the excavation activities meet the target cleanup goal of 9.0 mg/kg. Therefore, the interim removal action is considered complete, and no further investigation is recommended for Site 4. Residual human health risks for Site 4 will be documented in the feasibility study proposed for the site.

6. References

CH2M HILL. 1983. *Installation Restoration Program, Records Search, Phase I/Stage 1 for Air Force Plant 42, California.*

———. 2004a. *Final Remedial Investigation Report for Operable Units 1, 2, 3, 4, and 5, Air Force Plant 42, Palmdale, California.* Original date December 2003. Amended March.

———. 2004b. *Final Removal Action Workplan for Interim Removal Actions at IRP Sites 4 and 6, Air Force Plant 42, Palmdale, California.*

Engineering-Science, Inc. 1987. *Installation Restoration Program Phase II – Confirmation/ Quantification Stage 1, Final Report, Volumes I and II, U.S. Air Force Plant No. 42, Palmdale, California.*

Parsons Engineering Science. 1996. *Endangered Species Survey, Air Force Plant 42, Final Installation Report.* June.

Appendix A
Excavation Trench Logs

CH2MHILL

PROJECT NUMBER	BORING NUMBER	
171230.02.13.90	Site 4-Trench-1	SHEET 1 OF 1

TRENCH LOG

PROJECT : Air Force Plant 42 LOCATION : Site 4

ELEVATION : N/A DRILLING CONTRACTOR : El Capitan Environmental Services, Inc.

TRENCHING METHOD: Backhoe

WATER LEVEL : N/A START : March 1, 2005 END : March 4, 2005 LOGGER : K. Waite

TRENCH DIMENSIONS (in feet): Length: 25 Width: 8 Depth: 2.5 to 4

DEPTH BELOW SURFACE (FT)	INTERVAL (FT)	RECOVERY (FT)	NUMBER AND TYPE	STANDARD PENETRATION TEST RESULTS 6"-6"-6" (N)	SOIL DESCRIPTION: SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY, CONSISTENCY, SOIL STRUCTURE, MINERALOGY.	COMMENTS: DEPTH OF CASING, DRILLING RATE, TESTS, INSTRUMENTATION, SAMPLE ID, AND ORGANIC VAPOR READING (PID)
0		N/A	N/A	N/A	SAND (SP), dark grayish brown (10YR 4/3), medium to coarse grained sand with trace very coarse sand and trace silt, dry, loose.	No staining. No odor.
2		N/A	N/A	N/A	SILTY SAND (SM), dark yellowish brown (10YR 4/4), medium grained sand, trace very coarse sand, dry, slightly hard.	No staining. No odor.
4		N/A	N/A	N/A	SILTY SAND (SM), yellowish brown (10YR 5/6), fine grained sand, trace very coarse sand, dry, slightly hard.	No staining. No odor.

Appendix B
Waste Manifests

State of California—Environmental Protection Agency
Form Approved OMB No. 2050-0039 (Expires 9-30-99)
Please print or type. *Form designed for use on elite (12-pitch) typewriter.*

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. CAL000143486 — Manifest Document No. — 2. Page 1 of 1 — Information in the shaded areas is not required by Federal law.

3. Generator's Name and Mailing Address
PYRAMID SERVICES INC. - AIR FORCE PLANT #42
2501 EAST AVENUE 'P'
PALMDALE, CA 93550
4. Generator's Phone (661) 272-6720

A. State Manifest Document Number: 24033059
B. State Generator's ID:

5. Transporter 1 Company Name: RS — 6. US EPA ID Number: CAR000127910
C. State Transporter's ID [Reserved]:
D. Transporter's Phone: 661 946 1132

7. Transporter 2 Company Name — 8. US EPA ID Number
E. State Transporter's ID [Reserved]:
F. Transporter's Phone:

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT-KHF
35251 OLD SKYLINE ROAD
KETTLEMAN CITY, CA 93239
10. US EPA ID Number: CAT000646117
G. State Facility's ID:
H. Facility's Phone: (559) 386-9711

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. NON-RCRA HAZARDOUS WASTE SOLID (LEAD)	001	DT	00016	Y	State 611 / EPA/Other N/A
b.					State / EPA/Other
c.					State / EPA/Other
d.					State / EPA/Other

J. Additional Descriptions for Materials Listed Above
a) PROFILE#EC6313 SOIL WITH LEAD

K. Handling Codes for Wastes Listed Above
a. — b. — c. — d.

15. Special Handling Instructions and Additional Information
a) IN CASE OF EMERGENCY CALL 1-800-424-9300

SITE: SAME AS ABOVE (FORMER BURN PIT)
WEAR PROPER PERSONAL PROTECTIVE EQUIPMENT WHEN HANDLING

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

GENERATOR

Printed/Typed Name	Signature	Month	Day	Year
[illegible]	[signature]	03	11	05

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
John Sedgwick	[signature]	03	11	05

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year

DO NOT WRITE BELOW THIS LINE.

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802: WITHIN CALIFORNIA, CALL 1-800-852-7550

DTSC 8022A (1/99)
EPA 8700—22

Yellow: GENERATOR RETAINS

State of California—Environmental Protection Agency
Form Approved OMB No. 2050-0039 (Expires 9-30-99)
Please print or type. *Form designed for use on elite (12-pitch) typewriter.*

K24-17

See Instructions on back of page 6.

Department of Toxic Substances Control
Sacramento, California

UNIFORM HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.	Manifest Document No.	2. Page 1 of 1	Information in the shaded areas is not required by Federal law.
CAL000143486			

GENERATOR

3. Generator's Name and Mailing Address
PYRAMID SERVICES INC. - AIR FORCE PLANT #42
2501 EAST AVENUE 'P'
PALMDALE, CA 93550

4. Generator's Phone (661) 272-6720

A. State Manifest Document Number: 24033060

B. State Generator's ID:

5. Transporter 1 Company Name: R.T.S.

6. US EPA ID Number: CAR000127910

C. State Transporter's ID [Reserved]:

D. Transporter's Phone: (661) 946-1137

7. Transporter 2 Company Name:

8. US EPA ID Number:

E. State Transporter's ID [Reserved]:

F. Transporter's Phone:

9. Designated Facility Name and Site Address
CHEMICAL WASTE MANAGEMENT-KHF
35251 OLD SKYLINE ROAD
KETTLEMAN CITY, CA 93239

10. US EPA ID Number: CAT000646117

G. State Facility's ID:

H. Facility's Phone: (559) 386-9711

11. US DOT Description (including Proper Shipping Name, Hazard Class, and ID Number)	12. Containers No.	12. Containers Type	13. Total Quantity	14. Unit Wt/Vol	I. Waste Number
a. NON-RCRA HAZARDOUS WASTE SOLID (LEAD)	001	DT	00018	Y	State 611 EPA/Other N/A
b.					State EPA/Other
c.					State EPA/Other
d.					State EPA/Other

J. Additional Descriptions for Materials Listed Above
a) PROFILE#EC6313 SOIL WITH LEAD

K. Handling Codes for Wastes Listed Above
a. b. c. d.

15. Special Handling Instructions and Additional Information
a) IN CASE OF EMERGENCY CALL 1-800-424-9300

SITE: SAME AS ABOVE (FORMER BURN PIT)
WEAR PROPER PERSONAL PROTECTIVE EQUIPMENT WHEN HANDLING

16. **GENERATOR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by proper shipping name and are classified, packed, marked, and labeled, and are in all respects in proper condition for transport by highway according to applicable international and national government regulations.

If I am a large quantity generator, I certify that I have a program in place to reduce the volume and toxicity of waste generated to the degree I have determined to be economically practicable and that I have selected the practicable method of treatment, storage, or disposal currently available to me which minimizes the present and future threat to human health and the environment; OR, if I am a small quantity generator, I have made a good faith effort to minimize my waste generation and select the best waste management method that is available to me and that I can afford.

Printed/Typed Name	Signature	Month	Day	Year
Ed Sanchez		03	11	05

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year
Kevin L Maxwell		03	11	05

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Month	Day	Year

FAC

19. Discrepancy Indication Space

20. Facility Owner or Operator Certification of receipt of hazardous materials covered by this manifest except as noted in Item 19.

Printed/Typed Name	Signature	Month	Day	Year

DO NOT WRITE BELOW THIS LINE.

Yellow: GENERATOR RETAINS

IN CASE OF EMERGENCY OR SPILL, CALL THE NATIONAL RESPONSE CENTER 1-800-424-8802: WITHIN CALIFORNIA, CALL 1-800-852-7550

-40-06-

Appendix C
Laboratory Analytical Results Summary for Removal Action Confirmation Sampling

Appendix C
Laboratory Analytical Results for Site 4

C1 Normal and Duplicate Samples
C2 Quality Assurance/Quality Control Blank Samples
C3 Matrix Spike/Matrix Spike Duplicate Samples

Appendix C1

Soil Sample Results for Normal and Duplicate Samples

Site 4

QAQC Type	Sample Date	Field ID	Method	Analyte	Final Result	Final Validation Flag	RL	MDL	Units
N	2-Mar-05	04SFE1001	SW6020	Arsenic	1.9	F	2.0	0.10	mg/Kg
N	4-Mar-05	04SFE1002	SW6020	Arsenic	4.5	=	0.25	0.13	mg/Kg
N	1-Mar-05	04SFE2001	SW6020	Arsenic	14	=	2.4	0.12	mg/Kg
N	4-Mar-05	04SFE2002	SW6020	Arsenic	5.2	=	0.27	0.13	mg/Kg
FD	1-Mar-05	04SFE2101	SW6020	Arsenic	10	=	2.6	0.13	mg/Kg
N	2-Mar-05	04SFE3001	SW6020	Arsenic	3.5	=	3.0	0.15	mg/Kg
N	1-Mar-05	04SFE4001	SW6020	Arsenic	3.5	M	2.2	0.11	mg/Kg
N	4-Mar-05	04SFE4002	SW6020	Arsenic	4.2	=	0.25	0.12	mg/Kg
N	1-Mar-05	04SFE5001	SW6020	Arsenic	8.0	=	2.2	0.11	mg/Kg

Notes:

Abbreviations

QAQC = Quality Assurance/Quality Control

N = Normal Samples

FD = Field Duplicate

MDL = Method Detection Limit

mg/Kg = milligrams per kilogram

RL = Reporting Limit

Data Qualifiers

"=" = Analyte was detected.

F = The analyte was positively identified, but the associated numerical value is below the reporting limit (RL).

M = A matrix effect was present.

Appendix C2

Quality Assurance/Quality Control Blank Samples

Site 4

QAQC Type	Sample Date	Field ID	Method	Analyte	Final Result	Final Validation Flag	RL	MDL	Units
EB	1-Mar-05	04SFE1401	SW6020	Arsenic	9.00E-05	U	0.020	9.00E-05	mg/L

Notes:

Abbreviations

QAQC = Quality Assurance/Quality Control

EB = Equipment Blank

MDL = Method Detection Limit

mg/Kg = milligrams per kilogram

RL = Reporting Limit

Data Qualifiers

U = Not detected.

Appendix C3
Matrix Spike/Matrix Spike Duplicate Samples
Site 4

QAQC Type	Sample Date	Field ID	Method	Analyte	Final Result	Final Validation Flag	RL	MDL	Units	Recovery	Recovery Units
MS	1-Mar-05	04SFE4001MS	SW6020	Arsenic	12	M	2.4	0.12	mg/Kg	-2.96E+06	Percent
SD	1-Mar-05	04SFE4001MSD	SW6020	Arsenic	12	M	2.3	0.12	mg/Kg	74	Percent

Notes:

Abbreviations
QAQC = Quality Assurance/Quality Control
MS = Matrix Spike
SD = Matrix Spike Duplicate
MDL = Method Detection Limit
mg/Kg = milligrams per kilogram
RL = Reporting Limit

Data Qualifiers
M = A matrix effect was present.

5090 Caterpillar Road Redding, California 96003 (530) 244-5227 ph (530) 244-4109 fax

Columbia Analytical Services INC.
An Employee - Owned Company

Ms. Trish Larson
CH2M HILL/CVO
2300 NW Walnut BLVD.
Corvallis, OR 97330-3538

Columbia Analytical Services Report
Air Force Plant 42
DE050473/DE473
902105

March 17, 2005

Submitted by:

Bryan Jones
Project Manager/Client Services

The test results provided in this data package meet the requirements of the NELAC Standards unless noted in the case narrative report.

Enclosures

xc: RDD Data Center Mr. James Laws

This report contains a total of 56 pages.

TABLE OF CONTENTS

CAS Lab Reference No.: DE473
Level I

Current CAS Redding Accreditation Programs

Federal and National Programs

- U.S Air Force, Air Force Center for Environmental Excellence (AFCEE)
  Approved laboratory for Wastewater and Hazardous Waste
- U.S. Army Corps of Engineers – MRD, HTRW Mandatory Center of Expertise
  Validated for Wastewater and Hazardous Waste
- Department of the Navy, Naval Facilities Engineering Service Center (NFESC)
  Approved laboratory for Wastewater and Hazardous Waste

State and Local Programs

- State of Arizona, Department of Health Services
  Approved laboratory for Hazardous Waste
  Lab ID# AZ0604
- State of Arkansas, Department of Environmental Quality
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# None
- State of California, Department of Health Services, National Environmental Laboratory Accreditation Program **(NELAP)**
  Approved laboratory for Drinking Water, Wastewater and Hazardous Waste
  Lab ID# 01105CA
  - Los Angeles County Sanitation District
    Approved laboratory for Wastewater
    Lab ID# 10243
- State of Florida, Department of Health **(NELAP)**
  Approved Environmental Testing Laboratory for Wastewater and Hazardous Waste
  Lab ID# E87203
- State of Kansas, Department of Health and Environment **(NELAP)**
  Approved laboratory for Hazardous Waste
  Lab ID# E-10323
- State of Massachusetts, Department of Environmental Protection
  Approved laboratory for Drinking Water, Wastewater
  Lab ID# M-CA025
- State of Oklahoma, Department of Environmental Quality
  Approved laboratory for General Water Quality/Sludge Testing
  Lab ID# 9952
- State of Oregon, Department of Human Resources, Health Division **(ORELAP)**
  Approved laboratory for Drinking Water, Wastewater, and Hazardous Waste
  Lab ID# CA200004
- State of Utah, Department of Health, Division of Laboratory Services **(NELAP)**
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# QUAL1
- State of Washington, Department of Ecology, Environmental Laboratory Accreditation Program
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# C037
- State of Wisconsin, Department of Ecology
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# 999767340

Updated 4/13/2004

AFCEE Data Qualifiers

Qualifiers	Description
J	The analyte was positively identified, but the quantitation is an estimation.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the **MDL**.
F	The analyte was positively identified but the associated numerical value is at or below the **RL.**
R	The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.
B	The analyte was found in an associated blank, as well as in the sample.
M	A matrix effect was present.
S	To be applied to all field screening data.
T	Tentatively identified compound (using GC/MS).

Sample ID Cross-reference Table

CAS Lab Sample ID		Client Sample ID	Receive Date	Collect Date	Sample Matrix	Additional Description
FS = Field Sample; MS = Matrix Spike; MSD = Matrix Spike Duplicate; NON = Non-Sample Type (Internal Admin)						
DE473001	FS	06SFE1401	03/02/05	03/01/05 13:30	Water	
DE473002	FS	06SFE1501	03/02/05	03/01/05 13:40	Soil	
DE473002MS	MS	06SFE1501MS	03/02/05	03/01/05 13:40	Soil	
DE473002MSD	MSD	06SFE1501MSD	03/02/05	03/01/05 13:40	Soil	
DE473003	FS	06SFE2001	03/02/05	03/01/05 13:45	Soil	
DE473004	FS	06SFE2101	03/02/05	03/01/05 13:50	Soil	
DE473005	FS	06SFE3001	03/02/05	03/01/05 14:00	Soil	
DE473006	FS	06SFE4001	03/02/05	03/01/05 14:05	Soil	
DE473007	FS	06SFE5001	03/02/05	03/01/05 14:10	Soil	
DE473008	FS	06SFE6001	03/02/05	03/01/05 14:15	Soil	
DE473009	FS	06SFE7001	03/02/05	03/01/05 14:20	Soil	
DE473010	FS	06SFE8001	03/02/05	03/01/05 14:25	Soil	
DE473011	FS	04SFE1401	03/02/05	03/01/05 15:10	Water	
DE473014	FS	04SFE2001	03/02/05	03/01/05 14:52	Soil	
DE473015	FS	04SFE2101	03/02/05	03/01/05 14:50	Soil	
DE473016	FS	04SFE4001	03/02/05	03/01/05 15:01	Soil	
DE473016MS	MS	04SFE4001MS	03/02/05	03/01/05 15:01	Soil	
DE473016MSD	MSD	04SFE4001MSD	03/02/05	03/01/05 15:01	Soil	
DE473017	FS	04SFE5001	03/02/05	03/01/05 15:03	Soil	

The above lab sample ID's and cross reference information apply to samples as received by the laboratory. Modifiers to the lab sample ID may be added for internal tracking purposes. Any modified sample ID will be reflected in the appropriate case narrative only.

Relative Percent Difference Exceptions:
The Relative Percent Difference (RPD) for the following analytes in the replicate matrix spike analyses of DE473002MS and 002MSD were outside control criteria: Aldrin, Delta-BHC, Heptachlor, Heptachlor Epoxide, and Toxaphene. A re-extraction and reanalysis was performed, both results are reported. No further corrective action was appropriate.

Lab Control Sample Exceptions:
The control criterion was exceeded for the following analyte(s) in Laboratory Control Sample (LCS) PWB10302LCS: Alpha-BHC, Delta-BHC, Endosulfan Sulfate, and Endrin Aldehyde. Since the problem may indicate a potential bias in the analytical batch, all associated field samples were re-extracted and reanalyzed within hold time. The LCS met control criteria for the reanalysis. Note the results for the field samples were comparable for both determinations, which indicates the problem with the initial analysis was restricted to the LCS. Both sets of results are reported. An "RE" suffix is appended to the sample name to designate the results from the reanalysis. The data is flagged to indicate the problem.

Elevated Method Reporting Limits:
Sample DE473009 required a dilution due to the presence of the following elevated non-target analyte: Aroclor 1248. The reporting limits are adjusted to reflect the dilution.

PCB Aroclors by EPA Method 8082

Surrogate Exceptions:
The control criteria were exceeded for the following surrogate in sample DE473001 due to matrix interferences: Decachlorobiphenyl. A re-extraction and reanalysis was performed, but produced similar results. The results of both analysis are reported. No further corrective action was required.

Matrix Spike Recovery Exceptions:
The matrix spike recovery of Aroclor 1260 for DE473002MS and 002MSD were outside control criteria because of matrix interference. The chromatogram indicated the presence of Aroclor 1248, which prevented accurate quantitation of the target analytes. The problem stems from common peaks for Aroclor 1260 and 1248. Complete resolution of these two Aroclors is not possible, so a portion of Aroclor 1248 is unavoidably quantitated as Aroclor 1260. The net effect is a high bias to the value reported for Aroclor 1260 when this situation occurs. No further corrective action was appropriate.

Elevated Method Reporting Limits:
Samples DE473002, 002MS, 002MSD, and 009 required dilution due to the presence of elevated levels of Aroclor 1248. The reporting limits are adjusted to reflect the dilution.

Approved by: for Bryan Jones **Date:** 3-16-05

CHAIN OF CUSTODY DOCUMENTATION

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CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

5090 Caterpillar Road • Redding, CA 96003 • (530) 244-5227 • 800-695-7222 x10 • FAX (530) 244-4109

PAGE 1 OF 2

COC#
SR #
CAS Contact DE 473

Project Name: AFP 42 - TO 189	Project Number: 171230.02.08.04
Project Manager: Tim Smith	Report CC: James Laws
Company/Address: CH2M HILL, 3 Hutton Centre Dr Suite 200, Santa Ana, CA 92707	
Phone #: 714.435.6298	FAX#: 714 424 2198
Sampler's Signature: [signature]	Sampler's Printed Name: James Laws

ANALYSIS REQUESTED (Include Method Number and Container Preservative)

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	TOTAL NUMBER OF CONTAINERS	METALS* CIRCLE ON LIST BELOW	Pesticides 8081	PCBs 8082	REMARKS/ ALTERNATE DESCRIPTION
06SFE1401	1	3/1/05	1330	H2O	4		X	X	
06SFE1501	2 ms/msD	|	1340	soil	3		X	X	MS/MSD
06SFE2001	3	|	1345	soil	1		X	X	
06SFE2101	4	|	1350	|	1		X	X	
06SFE3001	5	|	1400	|	1		X	X	
06SFE4001	6	|	1405	|	1		X	X	
06SFE5001	7	|	1410	|	1		X	X	
06SFE6001	8	|	1415	|	1		X	X	
06SFE7001	9	|	1420	|	1		X	X	
06SFE8001	10	|	1425	|	1		X	X	

Preservative Key
0 NONE
1 HCL
2 HNO_3
3 H_2SO_4
4 NaOH
5 Zn. Acetate
6 MeOH
7 $NaHSO_4$
8 Other ______

* Circle the method and each appropriate metal

Total Metals/6010 Al As Sb Ba Be B Ca Cd Cr Cu Co Fe Pb L Mg Mn Mo Ni K Ag Na Se Sr Ti Tl Sn V Zn
Total Metals/7000 series: As Sb Cr Cu Pb Se Tl Hg
Total Metals/6020 series: Sb As Ba Be Cd Cr Co Cu Pb Mn Mo Ni Se Ag Tl V Zn

Dissolved Metals/6010: Al As Sb Ba Be B Ca Cd Cr Cu Co Fe Pb Li Mg Mn Mo Ni K Ag Na Se Sr Ti Tl Sn V Zn
Dissolved Metals/7000 series: As Sb Cr Cu Pb Se Tl Hg
Dissolved Metals/6020 series: Sb As Ba Be Cd Cr Co Cu Pb Mn Mo Ni Se Ag Tl V Zn

SPECIAL INSTRUCTIONS/COMMENTS [handwritten initials] 3-2-05

REPORT REQUIREMENTS
___ I. Results Only
___ II. Results + QC Summaries (LCS, DUP, MS/MSD as required)
___ III. Results + QC and Calibration Summaries
___ IV. Data Validation Report with Raw Data
___ V. Specialized Forms / Custom Report
Edata ___ Yes ___ No
AFCEE

INVOICE INFORMATION
PO#
BILL TO:

TURNAROUND REQUIREMENTS
___ 5 Day
___ Standard (10-15 working days)
✓ Provide FAX Results
Other 24 hr

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature: [signature]	Signature: FEDEX	Signature: [signature]	Signature	Signature	Signature
Printed Name: James Laws	Printed Name	Printed Name: Sanchez	Printed Name	Printed Name	Printed Name
Firm: CH2M Hill	Firm	Firm: CAS/Redding	Firm	Firm	Firm
Date/Time: ~~3/2/05~~ 3/1/05 / 1800	Date/Time	Date/Time: 3/2/05 1000	Date/Time	Date/Time	Date/Time

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

SCOC-1204-11

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PAGE 2 OF 2

COC# U 64

SR #

CAS Contact DE473

Project Name: AFI 42	Project Number: 171230.02.08.04
Project Manager: Tim Smith	Report CC: James Laws
Company/Address: CH2M Hill	
Phone #: 714 435 6298	FAX#: 714 424 2198
Sampler's Signature:	Sampler's Printed Name: James Laws

ANALYSIS REQUESTED *(include Method Number and Container Preservative)*

PRESERVATIVE

NUMBER OF CONTAINERS

METALS * CIRCLE ON LIST BELOW

Preservative Key
0 NONE
1 HCL
2 HNO_3
3 H_2SO_4
4 NaOH
5 Zn. Acetate
6 MeOH
7 $NaHSO_4$
8 Other _____

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX		REMARKS/ ALTERNATE DESCRIPTION
04SFE1401	11	3/1/05	1510	H_2O	X	~~24 hr~~ 10
~~04SFE3001~~	12		1459	soil	X	Canceled per James Laws 3-2-05 BA
04SFE1501	13 MS/MSD		1445		X	24 hr MS/MSD
04SFE2001	14		1462		X	
04SFE2101	15		1450		X	
04SFE4001	16 MS/MSD		1501		X	
04SFE5001	17		1503		X	
	per James Laws 3-2-05 BA					

* Circle which metals are to be analyzed

Total Metals/6010: Al (As) Sb Ba Be Ca Cd Cr Cu Co Fe Pb Mg Mn Mo Ni K Ag Na Se Tl Sn V Zn
Total Metals/7000 series: As Sb Cr Cu Pb Se Tl Hg

Dissolved Metals/6010: Al As Sb Ba Be Ca Cd Cr Cu Co Fe Pb Mg Mn Mo Ni K Ag Na Se Tl Sn V Zn
Dissolved Metals/7000 series: As Sb Cr Cu Pb Se Tl Hg

SPECIAL INSTRUCTIONS/COMMENTS Jut BA 3-2-05

REPORT REQUIREMENTS

____ I Results Only
____ II Results + QC Summaries (LCS, DUP, MS/MSD as required)
____ III Results + QC and Calibration Summaries
____ IV Data Validation Report with Raw Data
____ V. Specialized Forms / Custom Report
Edata ____ Yes ____ No
AFCEE

INVOICE INFORMATION

PO# _____
BILL TO: _____

TURNAROUND REQUIREMENTS

X 24 hr ____ 48 hr
____ 5 Day
____ Standard (10-15 working days)
____ Provide FAX Results

RELINQUISHED BY:	RECEIVED BY:	RELINQUISHED BY:	RECEIVED BY:
Signature / Date/Time	Signature / Date/Time: 3/2/05 1000	Signature / Date/Time	Signature / Date/Time
Printed Name / Firm	Printed Name: SANCHEZ Firm: CAS/Redding	Printed Name / Firm	Printed Name / Firm

SCOC-0302-11

Distribution: White - Return to Originator; Yellow - Lab Copy; Pink - Retained by Client

Columbia Analytical Services inc.
An Employee-Owned Company

5090 Caterpillar Road
Redding, CA 96003
Phone: (530) 244-5262
Fax #: (530) 244-4109

COOLER RECEIPT FORM

Project/Client: AFP 42 / CH2M HILL Batch No.: DE473

1. Cooler(s)/Sample(s) received on: 5/2/05 Shipped via: FX

   Shipping Bill # (s): 8515 4135 3720 # of Coolers/Packages 1

2. Radiological Screening by: [signature] Acceptable Rejected

3. Custody seals on outside of cooler: YES NO N/A
   If yes, where? Front ✓ Rear ____ Lt Side ____ Rt Side ____
   Seals intact: YES NO

COOLER/SAMPLE PROCESSING

4. Sample Processing/Tagging by: [signature]

5. Cooler(s)/Sample(s) Temp's: 2°C ____ ____ ____ ____
   (or)
   Temp. Blank (if included): ____ ____ ____ ____ ____

6. Type of packing material (circle): Ice Blue Ice Bubble Wrap Bubble Bags Zip Locks Webbing
   Other: ____

7. Custody papers properly filled out (ink, signed, dated, released, etc.)? YES NO

8. Containers arrived in good condition (not broken, leaking, etc.)? YES NO

9. Samples received with adequate holding time remaining to conduct analysis? YES NO

10. Container labels complete (i.e. analysis, preservation, date/time, etc.)? YES NO

11. Container labels and tags agree with custody papers? YES NO

12. Correct types of containers used for the tests indicated? YES NO

    a.) Adequate sample received? If not, note on Exception Report. YES NO

13. Containers supplied by: CAS Other

14. Preserved containers received with the appropriate preservative? YES NO N/A
    pH: ____ (or) See pH log.

15. VOA vials free of air bubbles? YES NO N/A

16. Trip Blank preparation date: ____ CAS Other N/A

17. Volatile Soil samples: Encores or Plugs in Vials
    Freezer or GC/MS Date: ____ Time: ____ N/A

See Exception Report for discrepancies.

Rev. 8/18/2004/ds

Metals

AFCEE
INORGANIC ANALYSIS DATA PACKAGE

Analytical Method:	SW-846	AAB#:	DE473
Base/Command:	AF PLANT 42	Contract #:	AF PLANT 42
Prime Contractor:	CH2M HILL/SCO		

Field Sample No.	Lab Sample ID.
O4SFE1401	DE473011
O4SFE2001	DE473014
O4SFE2101	DE473015
O4SFE4001	DE473016
O4SFE4001S	DE473016S
O4SFE4001SD	DE473016SD
O4SFE5001	DE473017

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: _____ Name: Elizabeth Gubser

Date: _____ Title: Metals Supervisor

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

alytical Method:	SW-846	Preparatory Method:	SW3020A	AAB #:	DE473
Contract #:	AF PLANT 42				
eld Sample ID:	O4SFE1401	Lab Sample ID:	DE473011	Matrix:	WATER
% Solids:	0.00	Initial Calibration ID:	030905ICPMS		
Date Received:	05-Mar-02	Date Prepared:	05-Mar-03	Date Analyzed:	05-Mar-09
oncentration Units (mg/L or mg/kg dry weight):	MG/L				

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.00009	0.02000	0.00009	1	U

Comments:

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

Analytical Method:	SW-846	Preparatory Method:	SW3050B	AAB #:	DE473
Contract #:	AF PLANT 42				
Field Sample ID:	O4SFE2001	Lab Sample ID:	DE473014	Matrix:	SOIL
% Solids:	81.50	Initial Calibration ID:	030905ICPMS		
Date Received:	05-Mar-02	Date Prepared:	05-Mar-02	Date Analyzed:	05-Mar-02
Concentration Units (mg/L or mg/kg dry weight):	MG/KG				

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.12	2.36	13.83	1	

Comments:

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

nalytical Method: SW-846 Preparatory Method: SW3050B AAB #: DE473

Contract #: AF PLANT 42

ield Sample ID: O4SFE2101 Lab Sample ID: DE473015 Matrix: SOIL

% Solids: 76.30 Initial Calibration ID: 030905ICPMS

ate Received: 05-Mar-02 Date Prepared: 05-Mar-02 Date Analyzed: 05-Mar-02

oncentration Units (mg/L or mg/kg dry weight): MG/KG

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.13	2.60	10.21	1	

Comments:

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

Analytical Method:	SW-846	Preparatory Method:	SW3050B	AAB #:	DE473
Contract #:	AF PLANT 42				
Field Sample ID:	O4SFE4001	Lab Sample ID:	DE473016	Matrix:	SOIL
% Solids:	87.70	Initial Calibration ID:	030905ICPMS		
Date Received:	05-Mar-02	Date Prepared:	05-Mar-02	Date Analyzed:	05-Mar-02
Concentration Units (mg/L or mg/kg dry weight):	MG/KG				

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.11	2.20	3.52	1	M

Comments:

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

nalytical Method:	SW-846	Preparatory Method:	SW3050B	AAB #:	DE473
Contract #:	AF PLANT 42				
eld Sample ID:	O4SFE5001	Lab Sample ID:	DE473017	Matrix:	SOIL
% Solids:	87.40	Initial Calibration ID:	030905ICPMS		
Date Received:	05-Mar-02	Date Prepared:	05-Mar-02	Date Analyzed:	05-Mar-02
oncentration Units (mg/L or mg/kg dry weight):	MG/KG				

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.11	2.24	7.95	1	

Comments:

5090 Caterpillar Road Redding, California 96003 (530) 244-5227 ph (530) 244-4109 fax

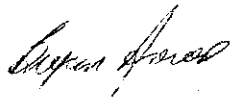
Columbia Analytical Services INC.
An Employee - Owned Company

Ms. Trish Larson
CH2M HILL/CVO
2300 NW Walnut BLVD.
Corvallis, OR 97330-3538

Columbia Analytical Services Report
Air Force Plant 42
DE050483/DE483
902105

March 14, 2005

Submitted by:



Bryan Jones
Project Manager/Client Services

The test results provided in this data package meet the requirements of the NELAC Standards unless noted in the case narrative report.

Enclosures

xc: RDD Data Center Mr. James Laws

This report contains a total of 19 pages.

TABLE OF CONTENTS

CAS Lab Reference No.: DE483
Level I

Current CAS Redding Accreditation Programs

Federal and National Programs

- U.S Air Force, Air Force Center for Environmental Excellence (AFCEE)
  Approved laboratory for Wastewater and Hazardous Waste
- U.S. Army Corps of Engineers – MRD, HTRW Mandatory Center of Expertise
  Validated for Wastewater and Hazardous Waste
- Department of the Navy, Naval Facilities Engineering Service Center (NFESC)
  Approved laboratory for Wastewater and Hazardous Waste

State and Local Programs

- State of Arizona, Department of Health Services
  Approved laboratory for Hazardous Waste
  Lab ID# AZ0604
- State of Arkansas, Department of Environmental Quality
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# None
- State of California, Department of Health Services, National Environmental Laboratory Accreditation Program **(NELAP)**
  Approved laboratory for Drinking Water, Wastewater and Hazardous Waste
  Lab ID# 01105CA
  - Los Angeles County Sanitation District
    Approved laboratory for Wastewater
    Lab ID# 10243
- State of Florida, Department of Health **(NELAP)**
  Approved Environmental Testing Laboratory for Wastewater and Hazardous Waste
  Lab ID# E87203
- State of Kansas, Department of Health and Environment **(NELAP)**
  Approved laboratory for Hazardous Waste
  Lab ID# E-10323
- State of Massachusetts, Department of Environmental Protection
  Approved laboratory for Drinking Water, Wastewater
  Lab ID# M-CA025
- State of Oklahoma, Department of Environmental Quality
  Approved laboratory for General Water Quality/Sludge Testing
  Lab ID# 9952
- State of Oregon, Department of Human Resources, Health Division **(ORELAP)**
  Approved laboratory for Drinking Water, Wastewater, and Hazardous Waste
  Lab ID# CA200004
- State of Utah, Department of Health, Division of Laboratory Services **(NELAP)**
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# QUAL1
- State of Washington, Department of Ecology, Environmental Laboratory Accreditation Program
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# C037
- State of Wisconsin, Department of Ecology
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# 999767340

Updated 4/13/2004

AFCEE Data Qualifiers

Qualifiers	Description
J	The analyte was positively identified, but the quantitation is an estimation.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the **MDL**.
F	The analyte was positively identified but the associated numerical value is at or below the **RL**.
R	The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.
B	The analyte was found in an associated blank, as well as in the sample.
M	A matrix effect was present.
S	To be applied to all field screening data.
T	Tentatively identified compound (using GC/MS).

Sample ID Cross-reference Table

CAS Lab Sample ID		Client Sample ID	Receive Date	Collect Date	Sample Matrix	Additional Description
FS = Field Sample; NON = Non-Sample Type (Internal Admin)						
DE483001	FS	O6SFE9001	03/03/05	03/02/05 11:00	Soil	
DE483002	FS	O4SFE1001	03/03/05	03/02/05 14:30	Soil	
DE483003	FS	O4SFE3001	03/03/05	03/02/05 14:40	Soil	

The above lab sample ID's and cross reference information apply to samples as received by the laboratory. Modifiers to the lab sample ID may be added for internal tracking purposes. Any modified sample ID will be reflected in the appropriate case narrative only.

CASE NARRATIVE

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M HILL/SCO	**Service Request No.:**	DE483
Project:	AF PLANT 42	**Date Received:**	3/3/05
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Three soil samples were received for analysis at Columbia Analytical Services on 3/3/05. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples was observed.

Organochlorine Pesticides by EPA Method 8081A

No anomalies associated with the analysis of these samples was observed.

PCB Aroclors by EPA Method 8082

No anomalies associated with the analysis of these samples was observed.

Approved by: Bryan Foos **Date:** 3-04-05

CHAIN OF CUSTODY DOCUMENTATION

Columbia Analytical Services, Inc.
An Employee - Owned Company
www.caslab.com

CHAIN OF CUSTODY/LABORATORY ANALYSIS REQUEST FORM

5090 Caterpillar Road • Redding, CA 96003 • (530) 244-5227 • 800-695-7222 x10 • FAX (530) 244-4109

PAGE 1 OF 1

COC#

SR #

CAS Contact DE 483

Project Name: AFP 42	Project Number: 171230.02.08.04
Project Manager: Tim Smith	Report CC: James Laws
Company/Address: CH2M Hill 3 Hutton Centre Dr Suite 200	
Phone #: 714 435 6298	FAX#: 714 424 2198
Sampler's Signature:	Sampler's Printed Name: James Laws

ANALYSIS REQUESTED *(Include Method Number and Container Preservative)*

PRESERVATIVE

TOTAL NUMBER OF CONTAINERS

METALS * CIRCLE ON LIST BELOW | PCBs 608 | PESTICIDES 608

Preservative Key
0 NONE
1 HCL
2 HNO_3
3 H_2SO_4
4 NaOH
5 Zn. Acetate
6 MeOH
7 $NaHSO_4$
8 Other _____

CLIENT SAMPLE ID	LAB ID	SAMPLING DATE	SAMPLING TIME	MATRIX	TOTAL NUMBER OF CONTAINERS	METALS *	PCBs 608	PESTICIDES 608	REMARKS/ ALTERNATE DESCRIPTION
06SFE9001	1	3/2/05	1100	Soil	1		X	X	PCBs rush priority
04SFE1001	2	1	1430	1	1	X			
04SFE3001	3	1	1440	1	1	X			

* Circle the method and each appropriate metal

Total Metals/6010 Al As Sb Ba Be B Ca Cd Cr Cu Co Fe Pb L Mg Mn Mo Ni K Ag Na Se Sr Ti Tl Sn V Zn
Total Metals/7000 series: As Sb Cr Cu Pb Se Tl Hg
Total Metals/6020 series: Sb As Ba Be Cd Cr Co Cu Pb Mn Mo Ni Se Ag Tl V Zn

Dissolved Metals/6010: Al As Sb Ba Be B Ca Cd Cr Cu Co Fe Pb Li Mg Mn Mo Ni K Ag Na Se Sr Ti Tl Sn V Zn
Dissolved Metals/7000 series: As Sb Cr Cu Pb Se Tl Hg
Dissolved Metals/6020 series: Sb As Ba Be Cd Cr Co Cu Pb Mn Mo Ni Se Ag Tl V Zn

SPECIAL INSTRUCTIONS/COMMENTS Use Bill 3305

REPORT REQUIREMENTS

___ I Results Only
___ II Results + QC Summaries (LCS DUP, MS/MSD as required)
___ III Results + QC and Calibration Summaries
___ IV Data Validation Report with Raw Data
___ V Specialized Forms / Custom Report
Edata ___ Yes ___ No

AFCEE

INVOICE INFORMATION

PO# _____
BILL TO: _____

TURNAROUND REQUIREMENTS

___ 5 Day ?
___ Standard (10-15 working days)
___ Provide FAX Results
Other 24 hr

RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY	RELINQUISHED BY	RECEIVED BY
Signature	Signature FEDEX	Signature	Signature	Signature	Signature
Printed Name James Laws	Printed Name	Printed Name Sanchez	Printed Name	Printed Name	Printed Name
Firm CH2M HILL	Firm	Firm CAS/RDG	Firm	Firm	Firm
Date/Time 3/2/05 1500	Date/Time	Date/Time 3/2/05 1000	Date/Time	Date/Time	Date/Time

SCOC-1204-11

Distribution: White - Return to Originator Yellow - Lab Copy Pink - Retained by Client

Columbia Analytical Services inc.
An Employee-Owned Company

5090 Caterpillar Road
Redding, CA 96003
Phone: (530) 244-5262
Fax #: (530) 244-4109

COOLER RECEIPT FORM

Project/Client: AE Plant 42 / CH2M Hill Batch No.: DE483

1. Cooler(s)/Sample(s) received on: 3/3/05 Shipped via: FV

   Shipping Bill # (s): 8571 4135 2928 # of Coolers/Packages 1

2. Radiological Screening by: [signature] (Acceptable) Rejected

3. Custody seals on outside of cooler: (YES) NO N/A
   If yes, where? Front ✓ Rear ✓ Lt Side _____ Rt Side _____

   Seals intact: (YES) NO

COOLER/SAMPLE PROCESSING

4. Sample Processing/Tagging by: [signature]

5. Cooler(s)/Sample(s) Temp's: 2.0c _____ _____ _____ _____
   (or)
   Temp. Blank (if included): _____ _____ _____ _____ _____

6. Type of packing material (circle): (Ice) Blue Ice (Bubble Wrap) Bubble Bags (Zip Locks) Webbing

   Other: _____

7. Custody papers properly filled out (ink, signed, dated, released, etc.)? (YES) NO

8. Containers arrived in good condition (not broken, leaking, etc.)? (YES) NO

9. Samples received with adequate holding time remaining to conduct analysis? (YES) NO

10. Container labels complete (i.e. analysis, preservation, date/time, etc.)? (YES) NO

11. Container labels and tags agree with custody papers? (YES) NO

12. Correct types of containers used for the tests indicated? (YES) NO

    a.) Adequate sample received? If not, note on Exception Report. (YES) NO

13. Containers supplied by: CAS (Other)

14. Preserved containers received with the appropriate preservative? YES NO (N/A)

    pH: _____ (or) See pH log.

15. VOA vials free of air bubbles? YES NO (N/A)

16. Trip Blank preparation date: _____ CAS Other (N/A)

17. Volatile Soil samples: Encores or Plugs in Vials

    Freezer or GC/MS Date: _____ Time: _____ (N/A)

See Exception Report for discrepancies.

Rev. 8/18/2004/ds

METALS

AFCEE

INORGANIC ANALYSIS DATA PACKAGE

ıalytical Method:	SW-846	AAB#:	DE483
Base/Command:	AF PLANT 42	Contract #:	AF PLANT 42
ime Contractor:	CH2M HILL/SCO		

Field Sample No.	Lab Sample ID.
O4SFE1001	DE483002
O4SFE3001	DE483003

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than ıe conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette ıas been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

ignature: _____ Name: Elizabeth Gubser

ıte: _____ Title: Metals Supervisor

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

Analytical Method:	SW-846	**Preparatory Method:**	SW3050B	**AAB #:**	DE483
Contract #:	AF PLANT 42				
Field Sample ID:	O4SFE1001	**Lab Sample ID:**	DE483002	**Matrix:**	SOIL
% Solids:	94.20	**Initial Calibration ID:**	030305ICPMS		
Date Received:	05-Mar-03	**Date Prepared:**	05-Mar-03	**Date Analyzed:**	05-Mar-03

Concentration Units (mg/L or mg/kg dry weight): MG/KG

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.100	2.04	1.88	1	F

Comments:

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

nalytical Method:	SW-846	Preparatory Method:	SW3050B	AAB #:	DE483
Contract #:	AF PLANT 42				
eld Sample ID:	O4SFE3001	Lab Sample ID:	DE483003	Matrix:	SOIL
% Solids:	70.70	Initial Calibration ID:	030305ICPMS		
Date Received:	05-Mar-03	Date Prepared:	05-Mar-03	Date Analyzed:	05-Mar-03
oncentration Units (mg/L or mg/kg dry weight):	MG/KG				

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.150	2.95	3.49	1	

Comments:

5090 Caterpillar Road Redding, California 96003 (530) 244-5227 ph (530) 244-4109 fax

Columbia Analytical Services INC.
An Employee - Owned Company

Ms. Trish Larson
CH2M HILL/CVO
2300 NW Walnut BLVD.
Corvallis, OR 97330-3538

Columbia Analytical Services Report
Air Force Plant 42
DE050501/DE501
902105

March 18, 2005

Submitted by:

Bryan Jones
Project Manager/Client Services

The test results provided in this data package meet the requirements of the NELAC Standards unless noted in the case narrative report.

Enclosures

xc: RDD Data Center Mr. James Laws

This report contains a total of 21 pages.

TABLE OF CONTENTS

CAS Lab Reference No.: DE501
Level I

Current CAS Redding Accreditation Programs

Federal and National Programs

- U.S Air Force, Air Force Center for Environmental Excellence (AFCEE)
  Approved laboratory for Wastewater and Hazardous Waste
- U.S. Army Corps of Engineers – MRD, HTRW Mandatory Center of Expertise
  Validated for Wastewater and Hazardous Waste
- Department of the Navy, Naval Facilities Engineering Service Center (NFESC)
  Approved laboratory for Wastewater and Hazardous Waste

State and Local Programs

- State of Arizona, Department of Health Services
  Approved laboratory for Hazardous Waste
  Lab ID# AZ0604
- State of Arkansas, Department of Environmental Quality
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# None
- State of California, Department of Health Services, National Environmental Laboratory Accreditation Program **(NELAP)**
  Approved laboratory for Drinking Water, Wastewater and Hazardous Waste
  Lab ID# 01105CA
  - Los Angeles County Sanitation District
    Approved laboratory for Wastewater
    Lab ID# 10243
- State of Florida, Department of Health **(NELAP)**
  Approved Environmental Testing Laboratory for Wastewater and Hazardous Waste
  Lab ID# E87203
- State of Kansas, Department of Health and Environment **(NELAP)**
  Approved laboratory for Hazardous Waste
  Lab ID# E-10323
- State of Massachusetts, Department of Environmental Protection
  Approved laboratory for Drinking Water, Wastewater
  Lab ID# M-CA025
- State of Oklahoma, Department of Environmental Quality
  Approved laboratory for General Water Quality/Sludge Testing
  Lab ID# 9952
- State of Oregon, Department of Human Resources, Health Division **(ORELAP)**
  Approved laboratory for Drinking Water, Wastewater, and Hazardous Waste
  Lab ID# CA200004
- State of Utah, Department of Health, Division of Laboratory Services **(NELAP)**
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# QUAL1
- State of Washington, Department of Ecology, Environmental Laboratory Accreditation Program
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# C037
- State of Wisconsin, Department of Ecology
  Approved laboratory for Wastewater and Hazardous Waste
  Lab ID# 999767340

Updated 4/13/2004

AFCEE Data Qualifiers

Qualifiers	Description
J	The analyte was positively identified, but the quantitation is an estimation.
U	The analyte was analyzed for, but not detected. The associated numerical value is at or below the **MDL**.
F	The analyte was positively identified but the associated numerical value is at or below the **RL.**
R	The data are unusable due to deficiencies in the ability to analyze the sample and meet QC criteria.
B	The analyte was found in an associated blank, as well as in the sample.
M	A matrix effect was present.
S	To be applied to all field screening data.
T	Tentatively identified compound (using GC/MS).

Sample ID Cross-reference Table

CAS Lab Sample ID		Client Sample ID	Receive Date	Collect Date	Sample Matrix	Additional Description
FS = Field Sample; NON = Non-Sample Type (Internal Admin)						
DE501001	FS	04SFE1002	03/05/05	03/04/05 10:30	Soil	
DE501002	FS	04SFE2002	03/05/05	03/04/05 09:45	Soil	
DE501003	FS	04SFE4002	03/05/05	03/04/05 10:45	Soil	
DE501004	FS	06SFW1001	03/05/05	03/04/05 09:00	Soil	
DE501005	FS	06SFW1002	03/05/05	03/04/05 09:05	Soil	

The above lab sample ID's and cross reference information apply to samples as received by the laboratory. Modifiers to the lab sample ID may be added for internal tracking purposes. Any modified sample ID will be reflected in the appropriate case narrative only.

CASE NARRATIVE

COLUMBIA ANALYTICAL SERVICES, INC.

Client:	CH2M HILL/SCO	**Service Request No.:**	DE501
Project:	AF Plant 42	**Date Received:**	3/5/04
Sample Matrix:	Soil		

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of Columbia Analytical Services, Inc. (CAS). This report contains analytical results for samples designated for Tier III validation deliverables including summary forms. When appropriate to the method, method blank results have been reported with each analytical test.

Sample Receipt

Five Soil samples were received for analysis at Columbia Analytical Services on 3/5/04. The samples were received in good condition and consistent with the accompanying chain of custody form. The samples were stored in a refrigerator at 4°C upon receipt at the laboratory.

Total Metals

No anomalies associated with the analysis of these samples was observed.

Approved by: _____ **Date:** _____

Metals Data Review and Narrative Worksheet

Service Request: DE501 Date: March 16, 2005

Methods: 6010B/6020/7471A Matrix: Solid

Analyst Signature: E. Sulh Date: 3-16-05

Reviewer Signature: [signature] Date: 3/18/05

Yes ☒ No ☐	Are all samples analyzed within hold times?
Yes ☒ No ☐	Are method blanks for all methods <MRL or less than 5% of the sample results?
Yes ☒ No ☐	Are MBs, CCVs, CCBs, LCSs, Dups, and MSs analyzed at the proper frequency?
Yes ☒ No ☐	Are ICVs, CCVs, and CCBs all within control limits?
Yes ☒ No ☐	Is the matrix spike within control criteria?
Yes ☒ No ☐	Are all LCS recoveries within control criteria?
Yes ☒ No ☐	Are the RPD's within control criteria?
Yes ☒ No ☐	Have MRLs been achieved in all samples (note dilutions and matrix interferences)?

For "No" responses see case narrative below.

Data Validation Notes and Discussion

File Path: Document6

CHAIN OF CUSTODY DOCUMENTATION

CAL[illegible] EN[illegible] ENV[illegible] ONM[illegible] TAL ~~LABORATORIES, INC.~~ CA: Reading

~~7440 LINCOLN WAY~~
~~GARDEN GROVE~~, CA 92841-1427
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHA[illegible] OF [illegible]STO[illegible] RE[illegible]ORD

Date 3/4/05

Page 1 of 1

LABORATORY CLIENT: CH2M HILL

ADDRESS: 3 Hutton Centre 200

CITY: Santa Ana STATE: CA ZIP: 92707

TEL: 714.435.6298 FAX: 714.424.2199 E-MAIL: jlaws@ch2m.com

TURNAROUND TIME: ☐ SAME DAY ☐ 24 HR ☐ 48 HR ☐ 72 HR ☒ 5 DAYS ☐ 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY): ☐ RWQCB REPORTING FORMS ☐ COELT EDF ☐

SPECIAL INSTRUCTIONS: ✡ Hold vol for STLC

CLIENT PROJECT NAME / NUMBER: AFP 42 171230.02.08.04

P.O. NO: Diesel

PROJECT CONTACT: James Laws

SAMPLER(S): (SIGNATURE) [signature]

COELT LOG CODE ☐☐☐☐

LAB USE ONLY ☐☐-☐☐☐☐

COOLER RECEIPT TEMP = ____ °C

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	FIELD POINT NAME (FOR COELT EDF)	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (G)	TPH (D) or	BTEX / MTBE (8260B) or	OXYGENATES (8260B)	VOCs (8260B)	5035 ENCORE PREP	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	~~CAC, T22~~ METALS (6010B) / 747	PNAs (8310) or (8270C)	VOCs (TO-14A) or (TO-15)	TPH(G) (TO-3M)	Access 3 Metals 6010/7000	Arsenic 6000 series			
	04 SFE 1002	1	3/4/05	1030	Soil	1															X			
	04 SFE 2002	2	|	945	|	1															X			
	04 SFE 4002	3	|	1045	|	1															X			
	06 SFW 1001	4	|	900	|	1														X		✡		
	06 SFW 1002	5	|	905	|	1														X		✡		

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
[signature]	FedEx	3/4/05	
Relinquished by: (Signature)	Received by: (Signature) D. [signature] CAS/RDG	3/5/05	0945
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date:	Time:

DISTRIBUTION: When with final report, Green to file, Yellow to Client
Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Green and Yellow copies respectively

RM 3/5/05 10/20/04 Revision

Q&Q Graphic 714-898-9702

Columbia Analytical Services inc.
An Employee-Owned Company

5090 Caterpillar Road
Redding, CA 96003
Phone: (530) 244-5262
Fax #: (530) 244-4109

COOLER RECEIPT FORM

Project/Client: AF PLANT 42/CH2M HILL Batch No.: DE501

1. Cooler(s)/Sample(s) received on: 3/5/05 Shipped via: FX

   Shipping Bill # (s): 8504 9962 4842 # of Coolers/Packages 1

2. Radiological Screening by: [signature] Acceptable Rejected

3. Custody seals on outside of cooler: YES NO N/A
   If yes, where? Front ____ Rear ____ Lt Side ____ Rt Side ____
   Seals intact: YES NO

COOLER/SAMPLE PROCESSING

4. Sample Processing/Tagging by: [signature]

5. Cooler(s)/Sample(s) Temp's: 2°c ____ ____ ____ ____
   (or)
   Temp. Blank (if included): ____ ____ ____ ____ ____

6. Type of packing material (circle): Ice Blue Ice Bubble Wrap Bubble Bags Zip Locks Webbing
   Other: ____

7. Custody papers properly filled out (ink, signed, dated, released, etc.)? YES NO
8. Containers arrived in good condition (not broken, leaking, etc.)? YES NO
9. Samples received with adequate holding time remaining to conduct analysis? YES NO
10. Container labels complete (i.e. analysis, preservation, date/time, etc.)? YES NO
11. Container labels and tags agree with custody papers? YES NO
12. Correct types of containers used for the tests indicated? YES NO
    a.) Adequate sample received? If not, note on Exception Report. YES NO
13. Containers supplied by: CAS Other
14. Preserved containers received with the appropriate preservative? YES NO N/A
    pH: ____ (or) See pH log.
15. VOA vials free of air bubbles? YES NO N/A
16. Trip Blank preparation date: ____ CAS Other N/A
17. Volatile Soil samples: Encores or Plugs in Vials
    Freezer or GC/MS Date: ____ Time: ____ N/A

See Exception Report for discrepancies.

Rev. 8/18/2004/ds

METALS

AFCEE
INORGANIC ANALYSIS DATA PACKAGE

Analytical Method:	SW-846	AAB#:	DE501
Base/Command:	AF PLANT 42	Contract #:	AF PLANT 42
Prime Contractor:	CH2M HILL/SCO		

Field Sample No.	Lab Sample ID.
04SFE1002	DE501001
04SFE2002	DE501002
04SFE4002	DE501003
O6SFW1001	DE501004
O6SFW1002	DE501005

Comments:

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hardcopy data package and in the computer-readable data submitted on diskette has been authorized by the Laboratory Manager or the Manager's designee, as verified by the following signature.

Signature: [signature] Name: Elizabeth Gubser

Date: 3/8/05 Title: Metals Supervisor

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

nalytical Method:	6020	Preparatory Method:	SW3050B	AAB #:	DE501
Contract #:	AF PLANT 42				
eld Sample ID:	04SFE1002	Lab Sample ID:	DE501001	Matrix:	SOIL
% Solids:	79.30	Initial Calibration ID:	031005ELAN		
ate Received:	05-Mar-05	Date Prepared:	05-Mar-09	Date Analyzed:	05-Mar-10
oncentration Units (mg/L or mg/kg dry weight):	MG/KG				

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.130	0.630	4.49	1	

Comments:

AFCEE FORM I-2

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

Analytical Method:	6020	Preparatory Method:	SW3050B	AAB #:	DE501
Contract #:	AF PLANT 42				
Field Sample ID:	04SFE2002	Lab Sample ID:	DE501002	Matrix:	SOIL
% Solids:	77.60	Initial Calibration ID:	031005ELAN		
Date Received:	05-Mar-05	Date Prepared:	05-Mar-09	Date Analyzed:	05-Mar-10
Concentration Units (mg/L or mg/kg dry weight):	MG/KG				

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.130	0.640	5.20	1	

Comments:

AFCEE

INORGANIC ANALYSES DATA SHEET 2

RESULTS

nalytical Method:	6020	Preparatory Method:	SW3050B	AAB #:	DE501
Contract #:	AF PLANT 42				
ield Sample ID:	04SFE4002	Lab Sample ID:	DE501003	Matrix:	SOIL
% Solids:	83.40	Initial Calibration ID:	031005ELAN		
ate Received:	05-Mar-05	Date Prepared:	05-Mar-09	Date Analyzed:	05-Mar-10
oncentration Units (mg/L or mg/kg dry weight):	MG/KG				

Analyte	MDL	RL	Concentration	Dilution	Qualifier
Arsenic	0.120	0.60	4.17	1	

Comments:

AFCEE FORM I-2

APPENDIX C

Data Validation Reports

APPENDIX

Metals (SW6010, SW6020,SW7471)

Data Validation Report

Project/Site Name: Air Force Plant 42

Sample Delivery Group (SDG): DE473

Parameters: Arsenic

Method: EPA Methods SW6020

Laboratory: Columbia Analytical Services

Samples:

Sample ID	Lab Sample ID	Collection Date	Matrix
04SFE1401	DE473011	3/1/2005	Water
04SFE2001	DE473014	3/1/2005	Soil
04SFE2101	DE473015	3/1/2005	Soil
04SFE4001	DE473016	3/1/2005	Soil
04SFE4001MS	DE473016MS	3/1/2005	Soil
04SFE4001MSD	DE473016MSD	3/1/2005	Soil
04SFE5001	DE473017	3/1/2005	Soil

Introduction/Summary

This data review report covers the sample delivery group and associated samples listed on the cover sheet. The analyses were per USEPA Method 6020. The quality assurance and quality control procedures (QA/QC) were per project specific sampling and analysis plan.

This review is based on the method and project approved QA/QC procedures and guidelines from AFCEE QAPP Version 3.1; the following subsections correlate to these guidelines. The sections detail noted deviations if any. Tables summarizing all data qualification flags are provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols (P) or is of a technical advisory nature due to sample matrix (A).

Data qualifiers, if any, are summarized at the end of this report.

I. Holding Times

Metals analyses were carried out within 6 months of collection.

II. Calibration

Initial calibration was performed daily prior to sample analysis as required. For ICP, the calibration curve was established using at a minimum a blank and one standard. The recovery was within 10% of expected value.

Initial calibration verification (ICV) was performed as required at the beginning of each run. All analytes were within ±10% of the expected values for ICP and ±10% for atomic absorption (AA) results.

Continuing calibration verification was performed every 10 samples and at the end of the analysis sequence as required. All analytes were within ±10% of the expected values for ICP and ±20% for graphite furnace results and cold vapor.

III. Blanks

A calibration blank was analyzed after every 10 samples and at the end of the analysis sequence for ICP analyses.

One method blank per analytical batch was prepared and analyzed.

The concentrations of analytes in the Method Blank were less than the reporting limits; however, analytes detected below the reporting limit are as follows:

Blank	Analyte	Concentration	Associated Samples
PBS	Arsenic	0.100 (RL=2.00)	04SFE2001 04SFE2101 04SFE4001 04SFE4001MS 04SFE4001MSD 04SFE5001
PBW	Arsenic	0.00009 (RL=0.02)	04SFE1401

***Samples are not flagged for detects below the reporting limit per AFCEE protocol. However, these blank detects may be accounted for in associated sample results towards final project decisions.

One equipment blanks (EB) was sent with the samples in this SDG. The concentrations of analytes in the field blank was less than the reporting limits, with no detections reported.

IV. ICP Interference Check Solution

ICP interference check results were not reported by the laboratory, however, the raw data show that the check was performed. Recoveries were within the control limits of 80-120.

V. Laboratory Control Sample

One laboratory control sample analysis per analytical batch was performed.

All percent recoveries were within project specified control limits for accuracy.

VI. Dilution Test

Dilution tests, if applicable, were performed by the laboratory. Data showed that the results from the 1:5 dilution were within 10% of the undiluted sample results, as applicable.

VII. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Sample Analysis

One MS/MSD pair per analytical batch was analyzed with this SDG. All percent recoveries and control limits were within project specifications for precision and accuracy with the following exceptions:

Sample ID	Analyte	MS %R	MSD %R	RPD	Associated Samples	Flag	A or P
04SFE4001	Arsenic	73.7 (75-125)	73.7 (75-125)	0.1 (20)	04SFE4001 04SFE4001MS 04SFE4001MSD	M	A

VIII. Compound Quantitation and Reporting Limits

Compound quantitation algorithm was verified to be correct.

The MDLs have been provided by the laboratory on the sample reports along with the reporting limits. The laboratory has established method detection limits (MDLs) per 40 CFR Part 136 Appendix B. The laboratory MDLs are found to be consistent with project needs.

IX. Overall Assessment

All data were found to be acceptable per specifications as noted above under introduction/summary with the exceptions of the samples and analytes listed in the table at the end of this report, if any.

Air Force Plant 42 Arsenic - Data Qualification Summary - SDG #DE473

SDG	Sample	Analyte	Flag	A or P	Reason
DE473	04SFE4001 04SFE4001MS 04SFE4001MSD	Arsenic	M	A	MS/MSD

Air Force Plant 42 Arsenic - Blanks Data Qualification Summary - SDG #DE473

No blank detects above the reporting limits were reported, thus meeting the QAPP specifications; however, the project team may qualify data at large for blank detects below the detection limit, if any.

Data Validation Report

Project/Site Name: Air Force Plant 42

Sample Delivery Group (SDG): DE483

Parameters: Arsenic

Method: EPA Methods SW6020

Laboratory: Columbia Analytical Services

Samples:

Sample ID	Lab Sample ID	Collection Date	Matrix
04SFE1001	DE483002	3/2/2005	Soil
04SFE3001	DE483003	3/2/2005	Soil

Introduction/Summary

This data review report covers the sample delivery group and associated samples listed on the cover sheet. The analyses were per USEPA Method 6020. The quality assurance and quality control procedures (QA/QC) were per project specific sampling and analysis plan.

This review is based on the method and project approved QA/QC procedures and guidelines from AFCEE QAPP Version 3.1; the following subsections correlate to these guidelines. The sections detail noted deviations if any. Tables summarizing all data qualification flags are provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols (P) or is of a technical advisory nature due to sample matrix (A).

Data qualifiers, if any, are summarized at the end of this report.

I. Holding Times

Metals analyses were carried out within 6 months of collection.

II. Calibration

Initial calibration was performed daily prior to sample analysis as required. For ICP, the calibration curve was established using at a minimum a blank and one standard. The recovery was within ±10 percent of expected value.

Initial calibration verification (ICV) was performed as required at the beginning of each run. All analytes were within ±10% of the expected values for ICP.

Continuing calibration verification was performed every 10 samples and at the end of the analysis sequence as required. All analytes were within ±10% of the expected values for ICP.

III. Blanks

A calibration blank was analyzed after every 10 samples and at the end of the analysis sequence for ICP analyses.

One method blank per analytical batch was prepared and analyzed.

The concentrations of analytes in the Method Blank were less than the reporting limits; however, analytes detected below the reporting limit are as follows:

Blank	Analyte	Concentration	Associated Samples
PBS	Arsenic	0.100 (RL=2.00)	04SFE1001 04SFE3001

***Samples are not flagged for blank detects below the reporting limit per AFCEE protocol. However, if needed these blank detects may be accounted for in associated sample results towards final project decisions per EPA guidance.

No field blank was analyzed with this SDG.

IV. ICP Interference Check Solution

ICP interference check results were not reported by the laboratory, however, the raw data show that the check was performed. Recoveries were within the control limits of 80-120.

V. Laboratory Control Sample

One laboratory control sample analysis per analytical batch was performed.

All percent recoveries were within project specified control limits for accuracy.

VI. Dilution Test

Dilution tests, if applicable, were performed by the laboratory. Data showed that the results from the 1:5 dilution were within 10% of the undiluted sample results, as applicable.

VII. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Sample Analysis

No MS/MSD pair was analyzed with this SDG.

VIII. Compound Quantitation and Reporting Limits

Compound quantitation algorithm was verified to be correct.

The MDLs have been provided by the laboratory on the sample reports along with the reporting limits. The laboratory has established method detection limits (MDLs) per 40 CFR Part 136 Appendix B. The laboratory MDLs are found to be consistent with project needs.

IX. Overall Assessment

All data were found to be acceptable per specifications as noted above under introduction/summary with the exceptions of the samples and analytes listed in the table at the end of this report, if any.

Air Force Plant 42 Arsenic - Data Qualification Summary - SDG #DE483

No data has been qualified for this SDG.

Air Force Plant 42 Arsenic - Blanks Data Qualification Summary - SDG #DE483

No blank detects above the reporting limits were reported, thus meeting the QAPP specifications; however, the project team may qualify data at large for blank detects below the detection limit, if any.

Data Validation Report

Project/Site Name: Air Force Plant 42

Sample Delivery Group (SDG): DE501

Parameters: Metals

Method: EPA Methods SW6010, SW6020, SW7471

Laboratory: Columbia Analytical Services

Samples:

Sample ID	Lab Sample ID	Collection Date	Matrix
04SFE1002	DE501001	3/4/2005	Soil
04SFE2002	DE501002	3/4/2005	Soil
04SFE4002	DE501003	3/4/2005	Soil
06SFW1001 – WASTE PROFILE	DE501004	3/4/2005	Soil
06SFW1002 – WASTE PROFILE	DE501005	3/4/2005	Soil

Introduction/Summary

This data review report covers the sample delivery group and associated samples listed on the cover sheet. The analyses were per USEPA Method 6010, 6020, and 7471. The quality assurance and quality control procedures (QA/QC) were per project specific sampling and analysis plan.

This review is based on the method and project approved QA/QC procedures and guidelines from AFCEE QAPP Version 3.1; the following subsections correlate to these guidelines. The sections detail noted deviations if any. Tables summarizing all data qualification flags are provided at the end of this report. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from specified protocols (P) or is of a technical advisory nature due to sample matrix (A).

Data qualifiers, if any, are summarized at the end of this report.

I. Holding Times

Metals analyses were carried out within 6 months of collection and for mercury within 28 days of collection.

II. Calibration

Initial calibration was performed daily prior to sample analysis as required. For atomic absorption (AA), the calibration curve was established using a minimum of one blank and three calibration standards for each analyte. The correlation coefficient (r) was ≥0.995. For ICP, the calibration curve was established using a blank and one standard.

Initial calibration verification (ICV) was performed as required at the beginning of each run. All analytes were within ±10% of the expected values for ICP and ±10% for atomic absorption (AA).

Continuing calibration verification was performed every 10 samples and at the end of the analysis sequence as required. All analytes were within ±10% of the expected values for ICP and ±20% for atomic absorption (AA).

III. Blanks

A calibration blank was analyzed after every 10 samples and at the end of the analysis sequence for ICP analyses.

One method blank per analytical batch was prepared and analyzed.

The concentrations of analytes in the Method Blank were less than the reporting limits; however, analytes detected below the reporting limit are as follows:

Blank	Analyte	Concentration	Associated Samples
ICB1	Antimony	0.017 (RL=10.000)	04SFE1002
	Cadmium	0.002 (RL=0.500)	04SFE2002
	Calcium	0.036 (RL=100.000)	04SFE4002
	Copper	0.009 (RL=2.000)	06SFW1001
	Molybdenum	0.008 (RL=3.000)	06SFW1002
PBS	Copper	0.360 (RL=2.000)	04SFE1002
	Iron	0.844 (RL=3.000)	04SFE2002
	Sodium	11.300 (RL=100.000)	04SFE4002
	Arsenic	0.13100 (RL=0.50000)	06SFW1001
			06SFW1002

***Samples are not flagged for detects below the reporting limit per AFCEE protocol. However, these blank detects may be accounted for in associated sample results towards final project decisions.

No field blanks were reported with this SDG.

IV. ICP Interference Check Solution

ICP interference check results were not reported by the laboratory, however, the raw data show that the check was performed. Recoveries were within the control limits of 80-120.

V. Laboratory Control Sample

One laboratory control sample analysis per analytical batch was performed.

All percent recoveries were within project specified control limits for accuracy.

VI. Dilution Test

Dilution tests, if applicable, were performed by the laboratory. Data showed that the results from the 1:5 dilution were within 10% of the undiluted sample results, as applicable.

VII. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Sample Analysis

No MS/MSD pair per analytical batch was analyzed with this SDG.

VIII. Compound Quantitation and Reporting Limits

Compound quantitation algorithm was verified to be correct.

The MDLs have been provided by the laboratory on the sample reports along with the reporting limits. The laboratory has established method detection limits (MDLs) per 40 CFR Part 136 Appendix B. The laboratory MDLs are found to be consistent with project needs.

IX. Overall Assessment

All data were found to be acceptable per specifications as noted above under introduction/summary with the exceptions of the samples and analytes listed in the table at the end of this report, if any.

Air Force Plant 42 Metals - Data Qualification Summary - SDG #DE501

No data has been qualified for this SDG.

Air Force Plant 42 Metals - Blanks Data Qualification Summary - SDG #DE501

No blank detects above the reporting limits were reported, thus meeting the QAPP specifications; however, the project team may qualify data at large for blank detects below the detection limit, if any.

Appendix D

Response to Comments

RESPONSE TO COMMENTS

This response to comments is for the *Draft Removal Action Completion Report for IRP Site 4, Air Force Plant 42, Palmdale, California,* dated August 2005. Comments were received from Tayseer Mahmoud, Senior Hazardous Substances Engineer, Department of Toxic Substances Control (DTSC) in a letter dated October 25, 2005.

This response to comments contains a copy of the original comment correspondence from DTSC followed by the Air Force's responses.

Department of Toxic Substances Control

Alan C. Lloyd, Ph.D.
Agency Secretary
Cal/EPA

5796 Corporate Avenue
Cypress, California 90630

Arnold Schwarzenegger
Governor

October 25, 2005

Ms. Robin Stankoff
ASC/ENVR - Building 8
1801 Tenth Street, Suite 2
Wright-Patterson AFB, Ohio 45433-7626

COMMENTS ON DRAFT REMOVAL ACTION COMPLETION REPORT FOR INSTALLATION RESTORATION PROGRAM (IRP) SITE 4, OPERABLE UNIT 5, AIR FORCE PLANT (AFP) 42, PALMDALE, CALIFORNIA

Dear Ms. Stankoff:

The Department of Toxic Substances Control (DTSC) has reviewed the subject document dated August 2005, prepared by CH2M HILL on behalf of the Air Force. Site 4 is part of Operable Unit (OU) 5 located in the southeastern portion of AFP 42 and was used for steam cleaning operations between 1954 and 1983. The leaking waste oil underground tank adjacent to the vehicle wash was removed in 1983 along with contaminated soil. Field investigations at Site 4 indicated the presence of arsenic in the drainage swale. The report documents the removal action activities performed in March 2005, site backfilling and restoration activities, and confirmation sampling conducted at IRP Site 4, Vehicle Washrack and Leaking Underground Storage Tank at Air Force Plant 42. Approximately 44 tons of soil was removed from the site and disposed as California hazardous waste at the Chemical Waste Management Facility in Kettleman City, California. The excavation area measured approximately 8 feet by 15 feet and the depth of the excavation was approximately 2.5 to 4 feet below ground surface (bgs).

Prior to backfilling with clean soil and restoration of the site to its original condition, confirmation soil samples and a duplicate were collected from the ditch bottom and surface soil upstream and downstream of the excavation to verify attainment of the target cleanup goals for the site. Based on the results of the confirmation sampling, the remedial action met the remediation standards specified in the approved Removal Action Workplan dated December 2004. Based on our review of the document, DTSC has the following comments:

1. Section 4.3 Laboratory QA/OC Summary and Results: Please provide laboratory Form 1s and data validation reports for sample analysis conducted for Site 4 removal action.

2. Section 4.3 Laboratory QA/OC Summary and Results: Analytical results for progress sample and a field duplicate were 13.83 milligrams per kilogram (mg/kg) and 10.21 mg/kg. To reduce relative percent difference (RPD) to acceptable levels below 25%, future sample should be homogenized by thorough mixing, and split into two samples before the samples are analyzed. Also, since duplicate samples are sent blind to the laboratory for analysis to evaluate the quality and precision of the analytical laboratory, co-located samples should not be collected because the metal concentrations may vary significantly. For metal analysis we recommend obtaining the duplicate sample by scooping soil into a zip-lock bag, thoroughly mixing the soil, and splitting the contents into identical containers used for regular samples.

3. Section 4.4 Cleanup Goal Evaluation: Table 4-1 summarizes the arsenic concentrations in six confirmation samples; however, Appendix C1 summarizes the results of nine samples. Two samples exceeded the target cleanup goal for the site. Please provide location and depth of all samples and a separate table for progress samples that exceeded cleanup goal.

4. Section 5 Conclusions and Recommendations: Please submit a residential human health risk assessment to support the recommended no further action for Site 4.

If you have any questions, please call me at (714) 484-5419.

Sincerely,

Tayseer Mahmoud
Senior Hazardous Substances Engineer
Office of Military Facilities
Southern California Operations Branch

cc: Mr. Juan Blanco
AFP #42 Environmental Restoration Advisory Board Co-Chair
38256 Hillcrest Drive
Palmdale, California 93551

cc: Mr. Tim Smith
Mr. James Laws
CH2M Hill
3 Hutton Center Drive, Suite 200
Santa Ana, California 92707

Mr. Douglas E. Feay
Lahontan RWQCB - Region 6
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Mr. Joe Urrutia
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Mr. Brian Davis, Ph.D.
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Mr. Ronald Okuda
Engineering Geologist
Department of Toxic Substances Control
5796 Corporate Avenue
Cypress, California 90630

Response to Comments by Tayseer Mahmoud/DTSC

1. Laboratory Form 1s and data validation reports have been added to Appendix C of the final report.

2. The field duplicate data is used to obtain information on the heterogeneity of the site sample matrix with regard to the specific analytes. The heterogeneity of metals and semivolatiles in soils is known to be large since these chemicals do not distribute well in the soil, whereas volatiles distribute better and thus represent a more homogeneous sample.

   The relative percent deviation of the field duplicate concentrations is a measure of the nature of the distribution, the larger the relative percent deviation the greater the heterogeneity. This information is useful to qualify the precision of the measured site sample concentrations. For this information to be representative of the true site conditions and, thus, the measured site sample concentrations, the field duplicates should not be homogenized but measured as is currently done. The limits for field duplicate deviations are not technical "acceptance criteria" but "advisories," whereas limits for laboratory standards are technical "acceptance criteria." The information obtained from field duplicates is useful as it helps put into perspective the precision of the measured concentrations; homogenization of duplicates eliminates this information. Therefore, no changes to duplicate sample collection are planned for future AFP 42 investigations.

3. Appendix C1 contains results for both progress and confirmation samples. Table 4-1 summarizes only the confirmation samples representative of the final site conditions. As requested in the comment, a separate table (Table 3-1) has been added to the report to document the results of the progress samples. The results of the final confirmation samples remain presented in Table 4-1.

4. Section 5 of the Removal Action Completion report has been revised to propose no further investigation at Site 4. The determination for no further action at Site 4 will be evaluated and documented in a feasibility study. The feasibility study will include a revised industrial risk assessment, as well as a residential risk assessment. These risk assessments will include data from confirmation samples collected during the removal action at Site 4.